University of Bath

PHD

The Impact of Political Corruption, Firm Concentration, and Venture Capitalists' Monitoring Failures on the Performance of U.S. IPOs

Huang, Chen

Award date:
2019

Awarding institution:
University of Bath

Link to publication

Alternative formats
If you require this document in an alternative format, please contact:
openaccess@bath.ac.uk

Copyright of this thesis rests with the author. Access is subject to the above licence, if given. If no licence is specified above, original content in this thesis is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International (CC BY-NC-ND 4.0) Licence (https://creativecommons.org/licenses/by-nc-nd/4.0/). Any third-party copyright material present remains the property of its respective owner(s) and is licensed under its existing terms.

Take down policy
If you consider content within Bath's Research Portal to be in breach of UK law, please contact: openaccess@bath.ac.uk with the details. Your claim will be investigated and, where appropriate, the item will be removed from public view as soon as possible.

Download date: 05. May. 2023

The Impact of Political Corruption, Firm Concentration, and Venture Capitalists' Monitoring Failures on the Performance of U.S. IPOs

Chen Huang

A thesis submitted for the degree of Doctor of Philosophy

University of Bath

School of Management

August 2019

Copyright notice

Attention is drawn to the fact that copyright of this thesis/portfolio rests with the author and copyright of any previously published materials included may rest with third parties. A copy of this thesis/portfolio has been supplied on condition that anyone who consults it understands that they must not copy it or use material from it except as licensed, permitted by law or with the consent of the author or other copyright owners, as applicable.

Access to this thesis/portfolio in print or electronically is restricted until……. *(date).*

Signed on behalf of the Doctoral College..............(print name) ……….

Declaration of any previous submission of the work

The material presented here for examination for the award of a higher degree by research has not been incorporated into a submission for another degree.

Candidate's signature

Declaration of authorship

I am the author of this thesis, and the work described therein was carried out by myself personally, with the exception of ………. article/chapter where of the work was carried out by other researchers.

Candidate's signature

Table of contents

Acknowledgements

First and foremost, I would like to express my sincere gratitude to my primary supervisor, Prof. Dimitrios Gounopoulos, who is very professional and helpful. During my four years of PhD studies, he always provides me with help whenever I encounter any problem in my research. Since I started my PhD in 2015, we have composed over 1,000 e-mails, conducted incomputable Skype talks and weekly face to face meetings. Thanks to his strong supports, I could develop and complete this thesis on time. Apart from research related issues, Dimitrios also generally shared his personal experience in academics, which guides me to a better career path. In real life, Dimitrios is not only my PhD supervisor, but also my life instructor and best friend. Moreover, I would also appreciate my second supervisor, Prof. David Newton, for his insightful suggestions during my PhD studies. His professional and rigorous academic attitude always inspires me to move on.

Further, I would also extend my deepest gratitude to my parents, and my girlfriend Dr. Xuan Zhao, who always support me materially and spiritually. I would not finish my PhD thesis without their continues help and motivation. In addition, I would like to thank my beloved friends and colleagues Dr. Haifeng Guo, Greg Hnatiw, Dr. Hang Pham, Dr. Cai Wang, Dr. Aoran Zhang and Dr. Victoria Patsika for helping me overcome difficulties during my PhD studies. Last but not least, We would like to acknowledge Professor Franklin Allen, Prof. Landier Augustin, Prof. Emanuele Bajo, Professor Jonathan Berk, Professor Tim Jenkinson, Professor Xiaoding Liu, Professor Roni Michaely, Prof. Jay Ritter, and anonymous participants at European Financial Management Association (EFMA) Annual Meetings (2017, 2018), Financial Management Association (FMA) European Conference 2018, Financial Management Association (FMA) Annual Meeting 2018 for their insightful comments which had dramatically improved the quality of this thesis.

Abstract

One of the most prominent characteristics of the public capital market is information asymmetry. During the process of going public, the asymmetric information exists between insiders (e.g., issuers) and outsiders (e.g., investors) because there is very limited public information about issuers when they operated as private firms. This will result in the uncertainty of firm values and consequently lead to IPO underpricing, which is a market anomaly when the share is priced under its intrinsic value. In this case, newly listed firms experience losses, as they are potentially able to raise more capital (e.g., with higher offer price sold). Apart from the short-run performance around the offering, over 30% of IPO firms cannot survive longer than five years after going public. There are either acquired by other firms or delisted due to any negative factors (e.g., bankruptcy). Nevertheless, investors can take advantage of specific firm characteristics at the time of the offering to gain further valuation in order to anticipate the issuer's future performance. Moreover, IPO is deemed as the most attractive way for venture capitalists (VCs) to exit their portfolio firms, as the return is substantially higher than M&As. As a special private fundraising entity, VCs' reputation and expertise are important for IPO's short-run and long-run performance.

Therefore, in this thesis, I examine the potential factors that affect an IPO's performance in different time horizon (e.g., short- and long- run). Specifically, I first question how political corruption affect firms' initial public offerings. Then, I investigate the relationship between a firm's geographically dispersed business interests at the time of going public and its post-IPO survivability. Lastly, I explore the impact of VCs' monitoring failures of previously backed IPOs on the performance of future supported newly listed firms.

First, I investigate the association between corruption and IPO underpricing. I find evidence that a politically corrupt environment increases underpricing and thereby imposes costs on firms that wish to access the initial public offering (IPO) market. The evidence indicates that the corruption effect applies only for small-sized issuers; moreover, the effect increases as the percentage of a firm's operations concentrated around its headquarter locations becomes greater. Further, I demonstrate that underwriters

play a vital role in promoting IPOs in a corrupt environment by increasing offer price revisions and reducing underpricing. Additionally, political corruption does not diminish the likelihood of pre-IPO shareholders' achieving wealth gains, but does reduce post-IPO financial performance. Overall, empirical evidence supports the notion that political corruption causes business uncertainty and a high degree of information asymmetry in the market.

Second, I explore the impact of geographic dispersion on IPO’s survivability. Using a text-based measure as proxy for a firm’s geographically dispersed business interests, I document that geographic dispersion increases the probability of failure risk for newly listed firms. I find that the effect is more pronounced in a soft information environment where information is not easily transferrable or verifiable over long distances, and in small communities where managerial social concerns dominate in decision-making. Moreover, I find that firms with spatially distributed business interests are negatively associated with post-IPO operating performance. Overall, the results are consistent with the argument that geographically dispersed firms are subject to internal information asymmetry and divert managerial focus away from shareholder value, which negatively affects corporate performance and eventually results in corporate failure. Our study suggests to the corporate world, stay concentrated to survive.

Finally, I investigate how discredited VCs affect IPO performance. I define discredited VC as those who failed to monitor their backed IPOs and result in post-offering litigations. I find discredited VC-backed IPOs experience higher underpricing and left more “money on the table”. Underwriters take advantage of offer price revisions to extract information from investors due to high information disparity. Further, IPO firms with discredited VCs exhibit declined post-IPO performance, as measured by operating return on assets and BHARs. Those IPOs are also associated with high failure risks. Lastly, I reveal it discredited VC-backed IPO with higher underpricing are less likely to face lawsuits, suggesting an insurance channel for the underpricing.

This thesis provides innovative evidence not only broadening up our scope to different areas of IPO related studies, but also contributing to a wide range of literature, including political corruption, firm’s geographic dispersion, and venture capital financing.

Importantly, studies included in this thesis may provide practical implications for different market participants (e.g., investors, regulators) to make efficient investment decisions.

Chapter 1 Introduction

1.1 Background and motivation

A private firm conducts an initial public offering (IPO) in order to trade in the public capital market, which also represents a transfer of ownership from the private to the public. During this process, the newly listed firms experience different challenges. One of the most prominent threat is the uncertainty of new issues deriving from the high information asymmetry problem, which result in greater IPO underpricing. When information asymmetry is high in the market, a majority of investors are lack of accurate information about IPO firms, known as uninformed investors; on the contrary, a small number of investors possess enough information about new issues which enable them to bid attractive shares, known as informed investors. Earlier studies suggest that investment banks have to underprice new issues in order to compensate uninformed investors and encourage them to participate in the market (e.g., Kevin Rock (1986); Beatty and Ritter (1986)).

Nevertheless, this would make issuer suffer losses, as the new shares could be potentially priced higher and close to the intrinsic value. Previous studies have presented the evidence of various factors related to uncertainty (information asymmetry) and IPO underpricing, including firm specific characteristics (e.g., age, size) (e.g., Ritter (1984); Alexander Ljungqvist and Wilhelm (2003)), venture capital (Megginson and Weiss, 1991), reputable underwriter and auditor (e.g., Carter, Dark and Singh (1998); Corwin and Schultz (2005); Weber and Willenborg (2003)), governance reform (Ekkayokkaya and Pengniti, 2012), firm location (Nielsson and Wójcik, 2016), the use of language in S-1 fillings (Loughran and McDonald, 2013), and media sentiment and coverage (Bajo and Raimondo, 2017). However, the relationship between political corruption and IPO underpricing remains an unexplored area.

Political corruption refers to an illegal activity when one party offers bribes to a public official in exchange for favors. In this regard, only a small number of firms can benefit from using bribes in the business because of the confidentiality of corrupt transactions and public officials would only accept bribes from their familiar partners.

Thus, political corruption significantly hampers economic growth as public officials become inefficient and the unfair competition between firms tends to be prevalent in the market. Consequently, firms operating in a politically corrupt environment are more likely to use more opaque disclosure to protect themselves from being exploited by corrupt officials (e.g., Stulz (2005); Durnev and Fauver (2011); Jared D Smith (2016)). This will make firms less transparent to outsiders, which increase information asymmetry and uncertainty. Due to the significant impact of political corruption on firms and financial market, we are motivated to investigate how corruption affects the firm's initial public offering. We also aim to reveal underwriter's role in a corrupt environment when bringing a firm to the public capital market. The second chapter presents an in-depth discussion between political corruption and IPO underpricing.

Apart from underpricing which represents the short-run performance around the offering, another important issue in newly listed firms is post-IPO survival which indicates an IPO's long-run performance. Firms have to deal with various challenges when their corporate structures have undergone significant changes from the private to the public, such as more intensive monitoring from investors and regulatory authorities. Evidence suggests that over 30% of IPOs were either failed or acquired within the first five years after listing due to poor performance (e.g., Loughran and Ritter (2002); Demers and Joos (2007)). Further, Bertrand and Schoar (2003) suggest that managers' ability to make the decision is critical for the firm's performance. Therefore, managerial decisions are vital for newly listed firms' post-IPO survival.

One of the most important firm's characteristics is geographically distributed business operations. Since distance affects information flow (Petersen, 2004), previous literature suggests that firm's geographic dispersion causes high information asymmetry between insiders and outsiders (Platikanova and Mattei (2016); Addoum, Kumar and Law (2017)); and between managers and shareholder which deteriorates agency conflicts, thereby affecting managerial decisions (Landier, Nair and Wulf, 2009). Being inspired by the impact of firms' geographically dispersed business interests on the information asymmetry and agency conflicts between managers and shareholders, we particularly explore how an IPO firm's geographic dispersion affects the survivability in the post-offering periods. We also investigate possible channels through which geographic dispersion affects IPO survival; namely, information asymmetry and agency conflicts.

The third chapter investigates this research topic and provides innovative evidence of the impact of geographic dispersion on corporate failures.

IPO is important for venture capitalists, as VCs can cash out from portfolio firms with high returns by taking them to go public. Further, because VCs are repeated market participants which accumulate abundant reputation and professional knowledge in the specific industry, they are recognized as value-adding services in the financial market. Due to the challenges that firms will experience in a public capital market, VCs tend to have in-depth involvements in portfolio firms in order to execute their certification and monitor roles. For example, VCs often take board positions in investee's corporate activities. They also hold a large number of shares in post-IPO periods, which act as major shareholders. However, recent studies suggest that VC's are less likely to cash out from IPOs because of IPO related litigations, which subsequently destroy their reputation and expose the shortage of their managerial abilities (e.g., Tian, Udell and Yu (2016)). However, it is unclear how these reputation damaged VCs affects IPO performance. Therefore, we examine the performance of newly listed firms with the participation of VCs who failed to prevent IPO frauds. Specifically, we focus on the IPO performance in the short and long run, including underpricing, post-offering operating performance, BHARs, and failure risks. In the fourth chapter, we present an in-depth analysis of the impact of reputation damaged VCs on IPO performances.

In the following sections, we summarize the methodology, main findings, and contributions of the three research topics discussed above.

1.2 Political corruption and firm access to the initial public offering

In this study, we set up four research questions which associate political corruption and IPO: 1) Whether a corrupt environment affects firms' going public process; 2) if so, we ask whether the prestigious investment bank acts as an important financial intermediary in the IPO market can help; 3) we are curious about whether pre-IPO shareholders' benefits are also affected by the politically corrupt environment; 4) we investigate the impact of political corruption on newly listed firms' post-offering performance. To answer these questions, we measure the politically corrupt environment as the number of corruption lawsuits per year divided by the total population during the same period in the state where IPO firm headquarter locates.

Consistent with the argument that political corruption causes information asymmetry and market uncertainty, we document a positive association between a corrupt environment and IPO underpricing. The evidence suggests that IPO firms leave more “money on the table” when the local political corruption is severer, implying potential losses for them. For the economic cost, on average, IPO firms potentially lose US$1.08 million for one standard deviation increase in the local political corruption rate. In addition, we reveal a vital certification role of prestigious banks when underwriting newly listed firms in a corrupt environment. Specifically, we find that investment banks with a good reputation can alleviate the corruption-effect on underpricing. Moreover, the prestigious banks tend to make efforts to induce private information from the informed investors during road shows in a corrupt environment, resulting in a higher number of offer price revisions. Finally, we find that corruption does not reduces pre-IPO shareholders’ wealth gains, but does negatively affect firms’ financial performance in post-offering periods.

In this study, we also consider endogeneity issues. We first use a two-stage least square approach to control for the IPO firm’s selection of headquarter locations. We then apply a propensity score matching (PSM) analysis to control for the observable differences of IPO and firm characteristics between low and high corrupt areas. All of these two methodologies confirm our main findings that political corruption increases IPO underpricing, thereby leaving “money on the table”. Finally, we use the firm’s geographically dispersed business interests to examine the interactive effect with political corruption on underpricing. In particular, we find that IPO firms experience higher underpricing if they have increased business concentration around their headquarter locations. This evidence provides a robust pattern that political corruption increases information asymmetry around the IPO, along with the increasing operations in the state where firms’ headquarter locates.

This study makes several significant contributions. First, our work extends the growing literature which addresses various negative impacts of political corruption on firm performance by showing that corruption imposes extra costs for firms to access the public capital market. Moreover, apart from other works which focus on M&As and corruption in the host countries (e.g., Delios and Henisz (2000)), our study is the first to associate the market uncertainty stemmed from political corruption with an IPO setting in the local market. Çolak, Durnev and Qian (2017) identify gubernatorial elections as political uncertainty and find that firms are less likely to conduct IPOs during the election period. Our study, however, provides appealing evidence that how corruption linked political uncertainty lead to direct economic costs in the IPO market, namely greater IPO underpricing.

1.3 Stay concentrated to survive

We investigate how IPO firms' geographically dispersed business interests affect their survivability in periods subsequent to the offering. We follow previous studies to measure an IPO firm's geographically distributed operations by counting the number of state citations from specific sections which illustrate corporate operations in 10-K Forms issued in the offering year (e.g., see, Garcia and Norli (2012); Platikanova and Mattei (2016)). We create a normalized Herfindahl-Hirschman index (HHI) to indicate the level of IPO firms' geographically dispersed business interests across the U.S. states. To evaluate the impact of geographic dispersion on IPO survival, we rely on the Cox proportional hazard model (CPH), an econometric approach which is wildly used to predict the timing of an event (e.g., IPO failure) by taking time horizons into account.

In empirical results, we reveal that newly listed firms with more geographically dispersed business interests experience higher failure risks in post-offering periods. We also classify firms into low and high dispersed groups. We find that firms with less dispersed businesses make it 0.756 times less likely to fail than firms with more dispersed businesses. Further, we document that firms share more competitions with industry rivals in the same state and firms' dispersed businesses are closely correlated with local economic shocks are less likely to fail in post-IPO periods. We argue that this is because more comparable information stemmed from competitors enables shareholders to urge managers to make efficient decisions, and local shocks that are deeply associated with dispersed businesses provide better information flow with managers in the firm.

Further, we explore the possible mechanisms which affect geographically dispersed newly listed firms' post-IPO survival. First of all, we find dispersed IPO firms are more likely to fail if they operate in a soft information-oriented industry. This is consistent with the argument that the soft information is difficult to be transferred and verified over long distances, which result in higher information asymmetry (e.g., Petersen (2004)). Second, we document that post-IPO failure risk is notably higher for small communities (e.g., less population) located dispersed firms in a soft information environment. This finding is consistent with Landier, Nair and Wulf (2009) that social concerns matter for managerial decision making, which have an impact on corporate performance. Thus, the results support our argument that geographic dispersion causes information asymmetry within the organization and deteriorates agency conflicts, thereby affecting corporate performance and result in IPO failures.

The findings in this study contribute to the vast body of literature which emphasize the relationship between geographic dispersion and corporate performance (e.g., Garcia and Norli (2012)). However, we are the first to address the ultimate consequence that geographic dispersion can cause for firms, which is corporate failures. Thus, this study provides both firms and investors with significant insights into managerial and investment decision making. Specifically, our works suggest firms need to be careful when expanding their businesses to other areas. They may need to consider more about managerial aspect when making expansion decisions. For investors, our findings suggest that they can anticipate IPO's future performance through observing the level of the firm's geographic dispersion.

1.4 The costs of monitoring failures: discredited VCs and IPO performance

In this study, we investigate how discredited VCs affect the performance of their backed IPOs. We define discredited VCs as those who failed to prevent IPO frauds and subsequently caused post-offering litigations. Our promise is that those VCs experience reputation damage and expose their reduced managerial ability because of the IPO lawsuits that they experienced, and therefore impose negative impacts on their future backed IPOs. We employ both short-run and long-run performance measures in this study, including IPO underpricing, operating return on assets, BHARs, and post-IPO survival.

We also explore why discredited VCs can tolerate high underpricing at the time of going public.

First of all, consistent with the argument that discredited VCs increase information asymmetry between their portfolio IPO firms and investors, we reveal a positive relationship between IPO underpricing and reputation damaged VCs. On average, discredited VC-backed IPO firms suffer a US $16.3 million hidden losses compared to non-discredited VC-backed IPOs. Moreover, we also find relevant evidence that underwriters extract private information from investors during roadshows in discredited VC-backed firms, as the offer price revision is higher. Second, we conjecture discredited VCs do not have sufficient managerial abilities because of the monitoring failures. Based on this argument, we document that discredited VC-backed IPOs experience declined operating returns on assets after going public, suggesting an inferior ability to generate profits based on the existing investments.

Similarly, investors also suffer losses with the shares they hold for discredited VC-backed IPOs, as the BHARs significantly lower for those issues. Through implementing a Cox hazard proportional model, we reveal that discredited VC-backed IPOs are associated with higher failure risks than their counterparts without any discredited VCs. Finally, empirical evidence shows that IPOs with discredited VCs are more likely to be sued in post-offering periods, confirming the problem of managerial ability of those VCs. However, this effect can be alleviated by greater underpricing.

Although previous literature has documented that VCs which are involved in litigations are less likely to cash out from IPOs, they do not indicate the economic consequences resulted from those VCs. To the best of our knowledge, we provide the first study to explore how reputation damaged VCs affect IPO performance. Importantly, our findings may suggest a value-reducing effect of discredited VCs, other than the general notion that VCs are value-adding financial intermediaries. Thus, investors may take advantage of VCs' monitoring failure experiences to better evaluate their portfolio firms and make efficient investment decisions.

Chapter 2 Political corruption and firm access to the initial public offering market

2.1 Introduction

Corruption is pervasive in the world which negatively affects the whole society and economies (e.g., Alesina and Angeletos (2005)). When corruption takes the form of rent seeking, it can establish barriers for firms that wish to conduct business (e.g., Dal Bó and Rossi (2007); Nguyen and Van Dijk (2012); Athanasouli and Goujard (2015); Paunov (2016)). Indeed, the World Economic Forum has pointed out that corruption raises the cost of business for firms by 10% on average worldwide (OECD, 2013). However, surprisingly little is known about how the rent-seeking behavior affects the Initial Public Offering (IPO), as going public is an important source for firms to access the capital market. In this study, we address this gap by investigating the relation between IPO outcomes and politically corrupt environments in the US.

The US is not a country with an extensive level of corruption. Transparency International gave the US a score of 76 out of 100 and ranked it sixteenth in the world in terms of corruption severity. Nevertheless, the Federal Bureau of Investigation (FBI) is devoted to eliminating corrupt activities in the US. For instance, William J. Jefferson, a Representative of Louisiana's 2^{nd} Congressional District since 1991, was convicted for taking advantage of his political position to offer favorable treatment for several American companies. Specifically, during 2000 to 2005, he received bribes of US$478,000 and helped his co-conspirators to seek billions of dollars additional income. Further, in a sting operation named "Tennessee Waltz" conducted by the FBI from 2002 onward, several state legislators were arrested after accepting more than US$150,000 in bribes to help a firm introduce new legislation that was beneficial to its business; however, the law has not been passed.

There are two main research streams that focus on corruption and firm performance. The first addresses the issue that corruption diverts a firm's productivity from its regular operations. In this regard, political corruption can reduce investment and research and development (R&D) expenses (Ades and Tella, 1997), make firms inefficient (Dal Bó and Rossi, 2007), obstruct firms that wish to attain access to business and regulation (Nguyen and Van Dijk, 2012), cause management and productivity to deteriorate (Athanasouli and Goujard, 2015), and establish barriers for firms that wish to obtain quality certificates (North (1990) and Paunov (2016)). The second research stream relates to firms that can benefit from rent-seeking behavior. The corruption mentality can help firms to deal with inefficient governments and poor local laws (Leff (1964) and Lui (1985)), and thus aid the firms' growth (e.g., Michael T Rock and Bonnett (2004), Vial and Hanoteau (2010) and Mironov (2015)). When bribery is used in business, it acts as part of the bargaining process between corrupt governments and firms (Paunov, 2016). Firms can benefit from such a process by offering bribes and quickly receiving governmental services such as municipal contracts. However, just a small number of firms can gain any advantage because corrupt officials only accept bribes from certain risk-free sources. In contrast, firms that do not have access to illicit business activities experience losses compared with their corrupt competitors. The effects of corruption on firm performance raise several interesting questions: Does political corruption have an impact on firms' access to public capital markets when the firms decide to go public? If so, do prestigious investment banks that act as intermediaries in the financial market provide help? How does a corrupt environment affect pre-IPO shareholders' benefits? Does political corruption affect firm’s post-IPO performance?

Motivated by the empirical evidence on this subject, we address the foregoing questions by examining the relationship between political corruption and IPOs' initial returns. We use a large, comprehensive sample of US newly listed issues from 1990 to 2015. We obtain data about corruption convictions from the US Department of Justice (DOJ) that relate to US public officials in each state and adopt per capita convictions in order to link such officials to the corrupt business environment. This approach is similar to that of Butler, Fauver and Mortal (2009) and Jared D Smith (2016)). However, in a departure from these studies, we measure corruption from 1976 to the appropriate IPO year to account for accumulated political corruption. In this regard, we consider the impact of the period before a firm goes public to the initial aftermarket returns.

Generally, the IPO market is characterized by information asymmetry, which causes uncertainty about firm value for investors and results in unusual initial returns (e.g., a high degree of underpricing) (Kevin Rock (1986); Levis (1990); Amihud, Hauser and

Kirsh (2003); Nielsson and Wójcik (2016)), which is the potential loss that represents "money left on the table" increases the cost of accessing the public capital market for IPO issuers. In this study, we argue that political corruption raises uncertainty in the local business environment for two reasons. First, if firms offer bribes to a corrupt governmental official, they are likely to adopt a means to prevent such corrupt behavior from being exposed to the public because of the need for secrecy (Murphy, Shleifer and Vishny, 1993). For example, such firms use a concentrated decision-making process, thereby making their organizational activities less transparent. Second, if firms suffer productive or managerial setbacks because of unfair competition caused by competitors' illicit business activities, these firms are likely to conceal their inferior situations from investors, resulting in increased ex ante uncertainty. In sum, we argue that political corruption unquestionably influences market information asymmetry and ex ante uncertainty, thereby affecting IPOs' initial returns.

We find evidence of political corruption's important effects on IPOs' initial returns. Specifically, we reveal that a corrupt environment is associated with higher IPO first-day returns in the US stock market. This effect is economically significant: A one standard deviation increase in the political corruption rate (PCR) is linked with a 1.06% increase in initial returns, which translates into US$1.08 million of "money left on the table" for a mean-sized issuer. The results indicate that political corruption causes a higher incidence of underpricing for small-sized but not large-sized firms. We argue that this is because 1) large-scale firms possess the capability and resources to secure themselves in the financial market and 2) such firms have better connections with politicians and are likely to use bribes for business, thereby enabling the firms to benefit from corruption. The overall findings are consistent with the resource redistribution model, which suggests that resources are re-allocated from one party to another party because of rent-seeking activities. Indeed, the finding that a higher incidence of underpricing is caused by corruption implies that IPO issuers incur opportunity costs and that investors benefit from more returns in the short term.

We consider the endogeneity that arises from the selection of headquarters by IPO issuers. A firm can choose to locate its headquarters in various US states, all of which have different corruption levels. This selection may affect financial and managerial decisions (e.g., Jared D Smith (2016)). Thus, ordinary least squares (OLS) estimates are potentially biased because of such self-selection. In order to address this concern, we implement a two-stage instrumental variable approach to reveal a corrupt environment's pure effect. Specifically, we select *educational level, racial heterogeneity*, and the *Gini ratio* at state level, all of which have a causal relationship with political corruption as instruments. Our results continue to hold after controlling for the endogeneity problem.

Given the argument that a politician has a greater ability to misappropriate money from a firm if the firm's business is concentrated in the politician's jurisdictional area (Jared D Smith, 2016), we find that political corruption does not affect initial returns and revisions when an IPO firm has no business in the vicinity of its headquarters. This finding implies that a firm has an incentive to move its business away from its headquarters to a state where there is less corruption. Further, the results imply that investors are disadvantaged when they evaluate new issues in politically corrupt environments. The reason is that information asymmetry and market uncertainty tend to be higher if firms concentrate their business on their headquarters' locations when such locations have high levels of corruption. This finding is reflected by greater initial returns.

Importantly, when examining the association between corrupt environments and underwriters, we reveal that a positive relationship exists between corruption and IPOs that offer price revisions. The evidence reflects a significant desire for information production in a corrupt environment during bookbuilding. We attribute this to the underwriters' promotional efforts, whereby they attempt to induce private information from informed investors and price shares close to their intrinsic values. Thus, we also document that a prestigious bank can reduce the incidence of underpricing in a politically corrupt environment. Further, we reveal that a corrupt business environment does not cause pre-IPO shareholders' benefits to deteriorate by demonstrating that corruption increases the likelihood of net wealth gains for insiders. This explains why issuers may not worry about losses from initial returns in a corrupt environment because pre-IPO shareholders still benefit from the shares they retain. The evidence supports prospect theory (Loughran and Ritter, 2002) and the wealth-maximizing hypothesis (Ang and Brau, 2003).

Moreover, when taking post-IPO financial performance into account, we find that newly listed firms experience a considerable decline of Tobin's Q, capital expenditure, and profitability after one year of listing compared with the IPO year. Thus, we conclude that firms that go public in environments with higher levels of political corruption are associated with negative post-IPO growth. The results support the view that for issuers, the market timing of an IPO is important for future development (e.g., Christoffersen, Nain and Tang (2010); Shantanu Banerjee, Güçbilmez and Pawlina (2016)).

Finally, we conduct various robustness checks. We first measure a corrupt environment from the year of a firm's incorporation to its IPO year and also use raw convictions as an alternative measure. We then exclude IPOs from Washington D.C. because corruption in this area is relatively higher than in others. Further, we adopt a perception-based measure, known as corruption scales, from Boylan and Long (2003). Lastly, we extract conviction data from the Transactional Records Access Clearinghouse (TRAC), an alternative database, which helps to build a full picture of corrupt environments. The results from using all these measures are robust in terms of our baseline findings and show that political corruption raises costs for firms that go public by generating higher first-day returns. In addition, we extract conviction data to create a measure for the environment of white-collar crime, which is another type of rent-seeking activity. The results suggest that our analysis is not caused by white-collar crime and is robust to political corruption.

Our study makes important and significant contributions to the literature on political corruption and IPOs. Prior studies theoretically and empirically demonstrate that political corruption negatively affects firm performance, but has a limited effect on managerial and productivity levels; thus, political corruption potentially causes extra costs for firms (e.g. Murphy, Shleifer and Vishny (1993); Bliss and Tella (1997); Ades and Tella (1997); Mo (2001); Fisman and Svensson (2007); Dal Bó and Rossi (2007); Bloom and Van Reenen (2010); Athanasouli and Goujard (2015)). To our knowledge, we provide the first study to present empirical evidence that political corruption imposes additional costs on firms in the IPO context by revealing that newly listed firms raise less capital than they are potentially able to raise. Further, some studies point out that corruption is related to a high degree of business uncertainty (e.g., Murphy, Shleifer and Vishny (1993); Ades and Tella (1997)). They also argue that a relationship exists between such uncertainty and mergers and acquisitions (M&A) in host countries (e.g., Delios and Beamish (1999); Delios and Henisz (2000); Slangen and Van Tulder (2009)). We examine business environment uncertainty that stems from corruption in the context of local financial markets. Specifically, we show that a high degree of market uncertainty that results from political corruption obstructs investors from gathering IPO information and assessing the corresponding firm's value, a situation that leads to greater underpricing.

Most corruption-related studies focus on the international arena. However, concentrating on individual countries is more appropriate because this approach controls for institutional and cultural factors (Fisman and Gatti, 2002). The US is usually treated as a country with low political corruption (e.g., International Country Risk Guide). Indeed, corruption may have a low impact on firm performance in the US because of the comprehensive and well-defined legal system. Thus, our study adds new evidence to the growing literature of within-country studies about the way in which corruption affects firm performance (e.g., Amore and Bennedsen (2013); Jared D Smith (2016)). Further, prior research presents various factors that could determine IPO performance, such as a firm's credit rating (An and Chan, 2008), international business activity (Mauer et al., 2015), and location (Nielsson and Wójcik, 2016). However, we address a new determinant of IPO short-term returns in the stock market: political corruption.

Our study also relates to research that addresses the relationship between politics and IPOs. The literature in this field explores the benefits that issuers can obtain from political connections (e.g., Gounopoulos et al. (2017)). We extend such work by providing new insights about the use of political corruption and thereby demonstrate that newly listed firms suffer losses because of political reasons rather than benefiting from them. Çolak, Durnev and Qian (2017) reveal that political uncertainty caused by gubernatorial elections has a negative impact on a firm’s decision to go public. We update their work by taking corrupt environments into account to show the economic consequences for IPOs that result from political uncertainty.

The rest of this paper is organized as follows. Section 2 discusses the relevant literature and section 3 presents the hypotheses' development. Section 4 explains the sample that we employed. Section 5 presents our preliminary findings and tests the robustness of our results. We then provide a discussion in section 6 and summarize the study.

.2.2 Literature review

2.2.1 Theoretical framework

The resource redistribution model, which addresses the relationship between rent seeking (corruption), production, and the economy was first modeled in the classic work by Murphy, Shleifer and Vishny (1993). According to their study, if rent seekers from the public or private sectors attempt to misappropriate values from society, such actions reduce the returns of production because more resources are allocated to rent seekers (e.g., corrupt public officials). Alternatively, misappropriation results in a third party losing an opportunity to share the resources in a market.

In terms of the foregoing research, suppose that a regional government has procurements that are open to bids from any firm. At the same time, a small number of firms are determined to bribe public officials to win the bids. Consequently, such corrupt business activity disrupts competitive fairness in the market and gives an advantage to those firms that offer bribes, enabling such firms to benefit from public resources. The corruption-free firms may then realize that they are trapped in an unexpectedly difficult situation in which they must compete with corrupt firms in an environment where resources have moved from the public to the bribers. Thus, corrupt activities can eventually damage the economy and output through the redistribution of resources. However, hidden costs will increase for those firms that operate in a corrupt business environment. In spirit of their work, we examine consequences of rent seeking in the IPO market.

2.2.2 Political corruption and firm performance

The literature has extensively uncovered the relationship between corruption and firm performance. Corruption can impede a firm’s growth directly or indirectly. Ades and Tella (1997) document that corruption can reduce investment and R&D expenditure by affecting an industry's policies. Dal Bó and Rossi (2007) argue that corruption can divert firms from their primary economic activities. They focus on electricity firms and find that these have to invest in additional input to produce the same amount of output in a corrupt environment. Athanasouli and Goujard (2015) report that corruption weakens a firm's management and aggregate productivity. They find that contract-dependent firms in a corrupt region have lower R&D investment and smaller product markets. In addition, the authors reveal that such firms are associated with a highly centralized decision-making mechanism. Paunov (2016) provides evidence that corruption reduces the probability of firms obtaining quality certification and decreases investment in innovation. However, the study fails to prove that corruption has a negative impact on the efforts of export-oriented and publicly traded firms to obtain relevant certifications and patents.

Although retrieving corruption-related information at the micro level is extremely difficult because of the need for secrecy about corrupt activities, a few studies have found ways to overcome this problem and use firm-level data to assess the sensitivity of business performance to corruption. Fisman and Svensson (2007) document that corruption hampers a firm's growth three times more than taxation. Specifically, the authors use bribery data from surveys of Ugandan firms and reveal that a one-percentage point increase in bribery payments results in a three-percentage points decrease in firm growth. Similarly, Nguyen and Van Dijk (2012) use different firm-level surveys that indicate the severity of perceived corruption in Vietnam. The authors conclude that corruption impedes private firm's growth but does not harm state-owned enterprises (SOEs). The reason may be the special interrelationship of SOEs with governmental officials, which benefits SOEs at the cost of private firms in a corrupt environment. The authors argue that the adverse effects of corruption on businesses can be mitigated by improving governance quality, lowering business entry costs, offering better land access, and ensuring better regulations in the private sector.

In contrast to the negative effects of corruption on firm performance, some studies consider the circumstance whereby malfeasance can benefit firms to some extent. First, from a macro perspective, some research focuses on the entire economy. Leff (1964) and Lui (1985) argue that corrupt activities enable firms to dispose of obstacles caused by local government, such as inefficient public services or incomplete laws. Michael T Rock and Bonnett (2004) reveal that corruption helps new, large industrializing economies grow faster in East Asia. They assert that the high level of growth in a highly corrupt environment originates from the trade-off whereby bribery is used in exchange for quicker and efficient services from governmental officials.

Second, few studies document the beneficial aspects of corruption at a micro level. Vial and Hanoteau (2010) measure corruption in terms of bribes and indirect tax payments to investigate how corruption affects firms in Indonesia. They present a long-term positive effect of corruption on plant growth, a finding that supports the "grease the wheels" hypothesis. Finally, Mironov (2015) uses a unique database of driving licenses from Russia and employs the propensity to corruption (PTC) as an objective measure. He documents that firms that use corrupt chief executive officers (CEOs) outperform their counterparts in terms of income diversion for their firms. Nevertheless, even if some firms can benefit from using bribes to conduct business, other firms that do not engage in illegal activities suffer potential losses and eventually leave the market (Bliss and Tella, 1997).

2.3. Hypotheses' development

Information uncertainty refers to the ambiguous information regarding a firm's true value in the market. Zhang (2006) argues that the uncertainty derives from poor information and the volatility of firms' fundamental financial performance. Similarly, Jiang, Lee and Zhang (2005) suggest that information uncertainty relates to the firm's ambiguous value of which professional investors cannot estimate it at a reasonable cost. However, unlike information uncertainty, information asymmetry implies that there are some informed investors bear more advanced internal information about firms' intrinsic value over other uninformed investors in the market. Thus, there is asymmetric information between the informed and uninformed market participants. In this study, we argue that political corruption increases information uncertainty in terms of firm value and deteriorates information asymmetry problem among investors.

2.3.1 Corrupt environments and IPO performance

Firm performance signals stock price stability and relates to future dividend distribution. Better firm characteristics can deliver benefits to investors. IPO investors may decide to stay away from risky environments because they are usually willing to pay a higher price for issues that have outstanding quality. Chiang, Qian and Sherman (2010) document that institutional investors always consider the value of the issue when investing in an IPO. Similarly, Neupane, Paudyal and Thapa (2014) reveal that institutional investors are sensitive to firm quality when they make investment decisions;

moreover, retail investors follow institutional investors if the latter perform well in the market. However, a rent-seeking environment can inherently destroy firm performance (e.g., Dal Bó and Rossi (2007); Nguyen and Van Dijk (2012); Athanasouli and Goujard (2015); Paunov (2016)).

If investors realize that the IPO firms in a corrupt environment do not show prospective financial achievement, they may not demonstrate the demand that the issuers expect. This situation causes a financial predicament for IPO firms; indeed, in such a corrupt environment, firms will have difficulty raising capital against securities in order to go public. Further, when operating under notable conditions of political corruption, issuers may be motivated to conceal from investors information such as financial or managerial deficiencies. For instance, issuers may use ambiguous language for some of the content in their IPO prospectuses in order to mislead investors. Consequently, when a corrupt environment damages firms' performance, such firms are less transparent when they go public.

Stulz (2005) and Durnev and Fauver (2011) reveal that firms tend to implement opaque disclosure policies to protect resources when they are surrounded by risks in rent-seeking business circumstances. Thus, when operating in a corrupt environment, firms are likely to hide financial information in order to avoid demands for bribes made by corrupt officials. Further, Jared D Smith (2016) finds that firms tend to decrease liquidity and increase debt obligations to limit expropriation when operating in uncertain, politically corrupt environments. In addition, investors find it hard to value firms that are engaged in corrupt business activities because of the firms' need for secrecy. For instance, using bribes for business may lead firms to centralize their decision-making processes to prevent information leakage (Athanasouli and Goujard, 2015), a situation that makes such firms less transparent.

Thus, a politically corrupt business environment increases market uncertainty and risks (Murphy, Shleifer and Vishny (1993); Ades and Tella (1997)). Beatty and Ritter (1986) argue that IPO underpricing should be resolved along with the ex-ante uncertainty of IPO firm value. Investors are more likely to become involved in a call option for information production during the IPO process when the strike price is compared with the offer price. When uncertainty is aggregated, investors require a lower offer price to increase the value of the call option in exchange for costly information collection. Consequently, IPOs that are issued in a corrupt environment and the increased ex ante uncertainty associated with them lead to our first hypothesis.

H1: IPOs in an environment with notable political corruption are associated with higher first-day returns.

Svensson (2003) argues that the amount of bribes that a firm is keen to offer depends on its "ability to pay." Thus, large firms may become long-term partners with corruption-prone governors and in return receive greater benefits from the bribes that they pay. As the resource redistribution model states, such rent-seeking activity has largely moved resources from the public to firms that resort to bribery, resulting in damage to those firms that do not benefit from corruption. Paunov (2016) reveals that corruption negatively affects the likelihood that firms obtain quality certificates and particularly has an impact on small firms. Thus, large firms do not worry about fighting against corruption in the same way as small firms (Dixit, 2015). Moreover, large firms usually have more resources and human capital to secure themselves in the market and thereby avoid adverse effects from corruption. Concentrating on the IPO context, if corruption does not exacerbate problems with firm performance, the issuer is less likely to conceal any disadvantages when going public. Consequently, this leads to lower uncertainty and information asymmetry for firm values, which enables investors to collect information about an IPO at a lower cost. Given this argument, we propose our second hypothesis.

H2: The level of corruption level should affect underpricing among small firms, with less or no effect among large firms.

2.3.2 Corrupt environments and offer price revisions

IPO revision is treated as an effective means for investment banks to collect private information from informed investors and induce them to reveal it (Benveniste and Spindt (1989); Hanley (1993)). During the bookbuilding process, the banks have discretion to distribute shares and make a final decision on the offer price. Benveniste and

Spindt (1989) develop an information acquisition model that suggests a good piece of news from informed investors lowers an IPO's offer price. This reduction represents compensation for providing private information. In contrast, some investors hide information deliberately. They are allocated fewer shares by investment banks as punishment. Offer price revision is sensitive to the uncertainty of firm value rather than the value per se (Cook, Kieschnick and Van Ness, 2006). A corrupt environment aggregates information asymmetry and market uncertainty; in other words, less informed investors trade in a corrupt environment, a situation that enlarges the information asymmetry problem between investors and investment banks. Thus, gathering information during road shows becomes more difficult when rent seeking is prevalent. We posit our third hypothesis by associating offer price revisions and corrupt environments.

H3: The demand for collecting information in corrupt environments is higher and is reflected by a greater number of offer price revisions.

2.3.3 The underwriter's role in corrupt environments

Habib and Ljungqvist (2001) point out that one of the promotional activities used by issuers is to hire prestigious investment banks that act as underwriters. Reputable underwriters are market participants that have been tested over the years and have reputations at stake. They have experience in promoting, supporting, and certifying IPOs. Their appearance in IPOs from rent-seeking environments should send a positive signal to investment organizations that have doubts about the new issues. Further, reputable underwriters have usually established close links with such investors (Alexander P Ljungqvist and Wilhelm (2002); Chen and Wilhelm (2008)). Thus, the underwriters can take advantage of their experience and networks to target particular investors in rent-seeking environments. For example, underwriters can invite institutional investors with expertise in the industries of IPO firms during the bookbuilding process. These investors can analyze firms accurately and thereby increase their confidence about issues in corrupt environments. Such confidence, in turn, reduces the cost of collecting information by investors. This situation helps underwriters to price issues at their intrinsic value.

Nevertheless, the ability of reputable underwriters to price issues close to their intrinsic value does not only depend on investors. If firms are from rent-seeking environments, their transparency may be lower. This circumstance restrains underwriters when evaluating the issues. In this regard, reputable underwriter may pay high salaries to experienced analysts, such as all-star analysts, to help evaluate IPOs. In turn, such analysts may overcome the problems caused by corrupt environments; for instance, the difficulty in fairly judging the extra expenditure that firms incur through public rent seeking. From this point onward, prestigious investment banks have greater bargaining power over issuers in corrupt environments. Wei Wang and Yung (2011) assert that reputable underwriters can incorporate information into the pricing of issues more accurately. Consequently, issuers from corrupt environments are willing to pay higher premiums in exchange for accurate issue pricing from reputable underwriters (e.g., Sherman and Titman (2002)). The advantages and superior abilities of prestigious investment banks in corrupt environments thus lead to our fourth hypothesis.

H4: Prestigious investment banks can price issues more accurately in politically corrupt environments.

2.4. Sample and data

2.4.1 Data

This study's sample includes shares of US common stock recorded in the Thomson One Banker database from January 1, 1990 to December 31, 2015. We exclude issues with offer prices below US$5 because of the restrictions imposed by the Penny Stock Reform Act of 1990 on such IPOs. In order to avoid further negative impacts on our sample from certain types of offerings, we follow prior literature and eliminate closed-end funds, unit offerings, real investment trusts (REITs), American depositary receipts (ADRs), and financial institutions (SIC between 6000 and 6999). This approach leaves the sample with 4670 observations. We also rely on the same database to collect each offering's information, including the offer price, the underwriter’s information, the ratio of the shares that insiders retain during the IPO, the number of bookrunners, and the primary market where the stock trades. We gather firm age and each underwriter’s reputation from Jay Ritter’s website. In order to identify an issuer’s location, we obtain information about its headquarters from Compustat and combine this with the source from Thomson One Banker to ensure the data's reliability.

2.4.2 Measures of politically corrupt environments

We extract the number of public corruption convictions from the *Report to Congress on the Activities and Operations of the Public Integrity Section*, released annually by the DOJ's Public Integrity Section (PIN) (Benveniste and Spindt, 1989), for each state between 1976 and 2015.[1] The report includes corruption-related cases that were mostly prosecuted by the US Attorney's Office and cases that were handled directly by PIN when the latter provided operational support. PIN's cases include criminal conflicts of interest, bribery, election crimes, and extortion.

We follow Glaeser and Saks (2006) and Butler, Fauver and Mortal (2009) in using the local, politically corrupt environment as a proxy. In this regard, we use the number of corruption convictions divided by the population, in terms of millions of people, in each state. Prior research has widely adopted this method (e.g., Glaeser and Saks (2006); Butler, Fauver and Mortal (2009); Jared D Smith (2016)). However, in a departure from other related studies, we consider cases where, for example, a firm goes public in 2000 and the corrupt environment deteriorates in the firm's state after 2001. In order to avoid such problems related to the year affecting the offering and the corruption status, we create a unique measure of a corrupt environment for the time at which a firm goes public. Further, because an IPO is a long and complicated process, considering the associated politically corrupt environment in either the IPO year only or any short period is unsuitable. Thus, we use an accumulated corrupt environment measure that accounts for the information asymmetry in the market before a firm goes public.[2] Namely, we calculate the number of public corruption convictions per million people from 1976 to the IPO year as follows.[3]

---

[1] For a missing value, we use the average number of convictions of the years adjacent to the missing observation.

[2] We must clarify that the accumulated corruption in a local environment various over time depending on the number of annual convictions and the population in the state. This situation is consistent with the notion that political corruption does not suddenly change but improves or worsens over the years. We provide examples in the Appendix. Nevertheless, the results remain quantitatively unchanged if we measure the corrupt environment at one, three, and five years before the firm going public. The results are provided in the Internet Appendix.

[3] We do not consider the lagging effect of a corrupt environment because corruption conviction cases have inherent characteristics of lagging (e.g., Smith, 2016). The reason is that the cases usually take years to be processed and completed by the courts.

$$PCR = \frac{number\ of\ convictions_{(from\ 1976\ to\ IPO\ year)}}{population\ in\ million_{(from\ 1976\ to\ IPO\ year)}} \quad (1)$$

where PCR is the political corruption rate, which is the measure of the politically corrupt environment in a particular state. One could argue that an appropriate measure should consider an IPO's month because the level of corruption in a particular environment may vary across the year. However, the DOJ does not release conviction data monthly.

We notice that IPOs from Washington D.C. have an environment with a higher level of corruption, ranging from 31.87 to 50.24 convictions per million people. Other states vary from 0.42 (Vermont) to 6.41 (Mississippi). It is unsurprising that Washington D.C. has such a highly corrupt environment for two reasons. First, Washington D.C. is the political center of the US, a circumstance that significantly increases the likelihood that public officials are corrupt. Second, there are fewer inhabitants in Washington D.C., thereby making the per capita conviction rate higher. Thus, we winsorize the PCR at the 1% and 99% levels at each tail because of such a large difference in Washington D.C. In our robustness test, we exclude IPOs from Washington D.C. and report similar results.

2.4.3 Sample statistics

Panel A of Table 1 provides descriptive statistics for the control variables used in our sample. The average *IPO initial return* is 19.01% with an average of 1.31 bookrunners involved. The mean (median) *firm age* is 15.05 years (eight years), with 40% of firms from the high-tech industry. Most issuers (73%) tend to hire prestigious underwriters. Firms backed by *venture capital* (*VC*) represent 44% of our sample. The average *ratio of shares that insiders retained during IPOs* (overhang) is 3.58%. The average *IPO offer price revision* is 11% with 65% experiencing upward revisions. Most IPOs (67%) were audited by the Big 4 accounting firms. 55% IPO insiders are able to manage positive gains, and 72% firms listed on Nasdaq and 73% were in hot market period. The average total proceeds raised by IPO firms are US $88.94 million. In term of financial performance, the average changes for Tobin's Q, capital expenditure and profitability from IPO year to one year after IPO are -0.03%, 205.62%, and 73%, respectively.

Panel B of Table 1 displays descriptive statistics categorized by the level of corruption. In order to define the *corruption* variable, we take the median of the PCR's time-series for each state and, if the PCR is greater (smaller) than the corresponding state's median, we classify it as an environment with a high (low) level of corruption. The results imply that the difference in IPO first-day returns and offer price revisions is large and significant. IPO firms with headquarters located in areas with high levels of corruption have an average initial return of 21.73%, which is greater than that of issuers from areas with relatively no corruption. The difference in offer price revisions is even larger: IPOs firms with headquarters in high-corrupt areas have average revisions that are 103% higher than an IPO from low-corrupt areas. Other control variables also exhibit statistical differences in means, except *total assets*, *proceeds*, $\Delta CapX$, *and* $\Delta Prof$.

In Table 2, we provide a list of each 10 IPOs that are ranked as having their headquarters located in environments with the highest (lowest) levels of political corruption. For comparative purposes, we also present the average first-day returns and "money left on the table" in the IPO years. Specifically, panel A of Table 2 reports the least 10 IPOs operating in the low corrupt environment, and panel B displays the foremost 10 IPOs operating in the highly corrupt environment and exclude the IPOs from Washington D.C. We take the lowest (highest) PCR value for the IPOs that share the same level of political corruption or are from the same state for panel A (panel B). We observe that, in most cases, the IPOs located in environments with relatively high (low) levels of corruption in the issuing years show excessive (reduced) initial returns and leave more (less) "money on the table" than those IPOs located in environments with average levels of corruption in the issuing years.

The unilateral comparative results are consistent with our primary hypothesis that a corrupt environment leads to a higher incidence of underpricing and a greater number of offer price revisions. However, the analysis does not take into account other influential factors. Thus, we control additional explanatory variables and conduct multivariate regression analysis to investigate the association between corrupt environments and IPO performance in the following sections.

2.5 Empirical findings

2.5.1 The association between political corruption and IPOs' initial returns

We now examine the relationship between politically corrupt environments and IPOs' initial returns. We control for various IPO-specific characteristics that have been found to have an impact on underpricing, together with year and industry effects (the coefficients are suppressed). Further, Butler, Fauver and Mortal (2009) argue that political corruption could be characterized by the general demographic features of US regions. Thus, following the US Census Bureau, we classify our sample into the West, Midwest, South, and Northeast based on the locations of the IPO issuers' headquarters. In this way, we include regional control in our regressions. Panel A of Table 3 reports the results of the estimations.

Column 1 of Table 3 includes only our main explanatory variable, *PCR*, which indicates the level of politically corrupt environment at the location of an IPO firm's headquarters. The *IPO initial return* variable appears to be positively related to *PCR* in this specification (significant at 1% level), corroborating the results of the univariate comparisons. We then gradually incorporate additional control variables that could have an impact on IPO initial returns in columns 2 to 4. The coefficients of *PCR* show consistently positive and high significant signs (e.g., at 1% levels), which provide strong evidence that local, politically corrupt environments are associated with a higher incidence of underpricing, a situation that causes IPO issuers potential losses in the public capital market. Using column 4 to illustrate the economic magnitude of the impact of corrupt environments on IPOs' initial returns, we observe that a one standard deviation increase in *PCR* implies a 1.26% increase in initial returns. This finding translates into a US$1.13 million potential loss for an average issuer.

We should emphasize that the foregoing analysis is based on the assumption that the selection of headquarters' locations by IPO issuers is exogenously determined. However, the location of a headquarters is not randomly selected. A firm can choose any state for its headquarters; however, states have environments with varied levels of corruption, levels that have an impact on the process of going public. Thus, the choice of headquarters' locations for IPO firms may act as an endogenous problem in our analysis.

Following Faulkender and Petersen (2006), An and Chan (2008), and Lin and Su (2008), we use a two-stage instrumental variable model to address this self-selection concern. The model requires the use of proper exogenous variables that can affect the dependent variable through a main explanatory variable but do not have a direct impact on the outcome (Wooldridge, 2015). Ideally, the variable should influence the choice of a firm's location of its headquarters in terms of the local, politically corrupt environment but should not influence the IPO's initial returns. Following Mauro (1995), Alesina, Baqir and Easterly (2000), Glaeser and Saks (2006), and Lochner (2007), we select *educational level*, *racial heterogeneity*, and the *Gini ratio* variables at state level to serve as identification restrictions. Prior studies demonstrate that racial heterogeneity can affect corruption because it may encourage politicians to use money transactions in exchange for political support from their ethnic groups (e.g., Glaeser and Saks (2006)). In order to construct the instrumental variables, we collect data from the US Census Bureau and match our sample by IPO year from t+1 to t+9 to a single value strictly after each census year.

Column 5 of Table 3 reports the results from the second step of a two-stage least squares (2SLS) regression to control for endogeneity[4]. As can be seen, instrumented *PCR* is positively related to underpricing at the conventional level (5%). Importantly, the reported p-value of the Durbin–Wu–Hausman test reject the possibility that *PCR* is not exogenous (p-value=0.35). Thus, our results using OLS estimations are not biased by the selection issue. We specifically consider IPO revisions in column 6. The results suggest that the incremental explanatory power of this covariate positively affects underpricing; yet the effect of *PCR* remains unchanged.

Next, we investigate the effect of corruption on underpricing among different firm dimensions. We keep all covariates included in panel A of Table 3 and divide the sample by firm size. We classify large firms as those with pre-IPO total assets in the top quartile in our sample. The results are presented in panel B. The estimations show a positive coefficient of 1.484 which is significant at 5% level for *PCR* for small-sized firms; in contrast, *PCR* displays a negative coefficient but with no statistical significance for large-sized firms. The evidence, as expected, suggests that political corruption does have an

[4] In the first stage of 2SLS approach, we find that the level of education is negatively associated with the degree of local corruption; while the political corruption increases with the local racial heterogeneity and gini ratio. The estimations show expected results which are aligned with previous studies (e.g., Glaeser and Saks (2006)). The results are tabulated in Appendix B.

impact on small issuers but has no effect on large ones. Particularly, investors are less confident about small firms with headquarters in politically corrupt environments and require higher premiums (e.g., more first-day returns). This is consistent with our conjecture that the stock performances of large firms are less likely to be influenced by corruption because of the benefits such firms may receive from the use of illegal business means or because of the firms' ability to keep themselves safe from corruption, thus leading to less uncertainty about IPOs and reduced costs of information collection for investors.

Most of the control variables are significant at the conventional level and show the expected signs in Penal A. *Firm age* appears to be negatively related to underpricing: An older firm generates lower information uncertainty because investors can acquire more knowledge about the business (Cliff and Denis (2004)). The positive and significant signs on *Total Assets* contradict the finding from Suman Banerjee, Dai and Shrestha (2011) which document a negative relation between firm size and underpricing, though they are partially consistent with Nielsson and Wójcik (2016). *Leverage* ratio is negatively associated with first-day returns, a finding that is aligned with the argument that when firms rely on debt financing, they should generate lower first-day returns (Gounopoulos et al. (2017)). High-tech firms and firms listed on Nasdaq stock exchange exhibit excessive initial returns as per Boulton and Campbell (2016) and Bajo and Raimondo (2017). The coefficients on *Top-tier* and *Venture capital* are positive, which support the view that investment banks lower the risk of underwriting new issues by underpricing more (Loughran and Ritter, 2004) and venture capitalists are likely to use underpricing to build their reputations (Neus and Walz, 2005). Moreover, the negative value on *Auditor* is in line with the argument that issuers can reduce information asymmetry through hiring reputable auditors and therefore lowering initial returns (Titman and Trueman, 1986). Although signs on those financial intermediaries are generally aligned with previous studies, they are not statistically significant except the sign on *Venture capital* in column 3. The positive and significant coefficients on *Share overhang* indicate that higher insider shareholdings implying lower dilution costs and greater level of underpricing (Bradley and Jordan, 2002). The *number of bookrunners* is related to lower underpricing because more bookrunners mean greater efforts regarding IPOs, resulting in fewer gaps between offer prices and firm value (Nielsson and Wójcik, 2016). Finally, the relationship between

Hot market and *initial returns* displays positive signs (e.g., Suman Banerjee, Dai and Shrestha (2011)), although they are not statistically significant.

Overall, in this section, we address that political corruption has a positive effect on IPO initial returns, because of high uncertainty and information asymmetry in the financial market.

2.5.2 IPO offer price revision

In this section, we test the association between IPO offer price revision and IPO firms that go public in politically corrupt environments. We measure offer price revision as the percentage change from the midpoint of the initial price range to the offer price (Corwin and Schultz, 2005). In order to capture the magnitude of revisions and the distinct price patterns at different levels of political corruption, we use the absolute value of IPO revisions. In addition, we create a dummy variable (*revision dummy*) to indicate upward revisions; namely, when an offer price exceeds the midpoint of the initial price range. If a corrupt environment results in more frequent offer price revisions because of the need for information to be revealed from investors, such an environment is also likely to generate more positive revisions. We again include year, industry, and regional controls in our analysis. Table 4 presents the results.

We first use *absolute revision* as the dependent variable. The insignificant estimate of *PCR* in column 1 of Table 4 suggests that IPOs are not easy to value alongside increases in local corruption. In column 2, the coefficient of *Revisions* is 0.433 and significant at 5% level, suggesting a positive relationship between IPO offer price revisions and politically corrupt environments. A one standard deviation increase in *PCR* results in a 0.348% rise in offer price revisions on average. In column 3, we run a logistic estimation using *revision dummy* as the outcome variable. In this instance, the coefficient of *PCR* is 0.103 and significant at the 1% level. The evidence implies that underwriters are more likely to revise offer price revisions upward in politically corrupt environments, which is corresponding to the results in column 2. Given that underwriters frequently revise offer prices because of the need for information production (Benveniste and Spindt, 1989), our results provide evidence that higher market uncertainty and severer information asymmetry exist in markets where there is political corruption. The results support our second hypothesis that a high demand exists for underwriters to induce private information in a corrupt environment, resulting in more IPO offer price revisions. The signs of the control variables are generally in line with those in the IPO literature.

2.5.3 The underwriter's role

Because we conjectured in our fourth hypothesis that prestigious banks have superior abilities to help firms operating in rent-seeking environments to mitigate the level of IPO underpricing, this section provides empirical evidence in support. We use two indicators to measure an underwriter's reputation: the underwriter's ranking, ranging from the lowest score of 0 to the highest score of 9, and a binary variable indicating whether an underwriter is from the top-tier by limiting the ranking to 7 or over. We follow prior related analysis and include year, industry, and regional controls. Table 5 presents the results.

For example, in Table 5 the coefficient of the interaction term *PCR*Underwriter Rank* is negative (-0.184) and significant at the 5% level, suggesting that investment banks with higher rankings can reduce IPO underpricing when working in severely corrupt environments. Similarly, the sign of *PCR*Top Tier* remains negatively correlated with initial returns and significant at the 5% level. Other control variables display expected signs and are consistent with Table 3. Importantly, in both columns, the coefficients of *PCR* remain positive and significant at the 1% levels. Thus, the estimates of interaction terms suggest that prestigious underwriters can reduce the level of initial returns while working in politically corrupt environments, therefore enabling IPO issuers to incur less "money left on the table". Overall, the results support our fourth hypothesis.

2.5.4 Geographic concentration

A firm's geographic concentration refers to the degree of business dispersal across different regions (Garcia and Norli, 2012). Jared D Smith (2016) reveals that firms with more operations in the states where their headquarters are based face negative impacts from local corruption because such firms tend to increase leverage to avoid illegal expropriations from public officials. This finding supports that of Bai et al. (2014), who use survey-based bribe-related data to document that firms with greater business mobility suffer less from demands for bribes. Further, public officials should gain bargaining power over a firm that has its business concentrated entirely in the local area (Jared D Smith, 2016). This means that a state governor with a tendency for corruption is likely to control regional commercial resources, such as export/import permits and tax abatements. Thus, we should expect that a firm with its business concentrated to a greater extent in the state where its headquarters is located is surrounded by a higher level of uncertainty and more information asymmetry when it goes public.

In order to measure an IPO firm's geographic concentration, we follow Garcia and Norli (2012) to see how many times each state is mentioned in a firm's 10-K report from 1993 to 2015.[5] We use the first available related filling reported for the IPO year from the Electronic Data Gathering, Analysis, and Retrieval (EDGAR) database. We merge our geographic concentration data with Garcia and Norli (2012) to ensure the data's authenticity.[6] Because of the information's availability, the sample reduces to 3504 observations.

Following Jared D Smith (2016), we create an indicator named *Operation Concentration %*. This indicator measures the percentage of a firm's business concentration in the state where its headquarters is located by using the citation factor of headquarters' locations over all states. In order to examine the association between a firm's operational business concentration and IPO outcomes (e.g., initial returns and offer price revisions), we include an interaction between *PCR* and *Operation Concentration %*. We also include year, industry, and regional controls. The results are tabulated in Table 6.

The dependent variable in column 1 is the percentage initial return. The coefficient of the interaction term, *PCR*Operation Concentration %*, is 3.14 and significant at the 5% level. This finding suggests that a firm with a higher concentration of its business operations in the state where its headquarters is located, and where there is political corruption, has greater initial returns at the time of its IPO. Moreover, the coefficient of *Operation Concentration %* is significantly negatively related to initial returns. We,

[5] When the 10-K report is unavailable, we follow Garcia and Norli (2012) and use alternative reports. A further discussion can be found in Appendix A.
[6] Garcia and Norli (2012) collected the data from 1993 to 2008 which is available to download from their website. We thank them to generally sharing the data.

therefore, hypothesize that information asymmetry should be lower if a firm's operation is intensified around the HQ location. To further examine this conjecture, we use IPO offer price revisions in column 2 as the dependent variable. First, the negative and significant sign on *Operation Concentration%* reveals a negative relation between firm's operation concentration and revisions, which consequently leading to a less difficult information gathering process for investors and underwriters. Further, we find a positive and significant coefficient of the interaction term *PCR*operation Concentration%*. The result implies that there is high information asymmetry in the market when IPO firms have greater business concentration around the HQ locations, which support our third hypothesis. Finally, the estimates of *PCR* in columns 1 and 2 are not statistically significant, implying that political corruption does not affect an IPO's initial returns and offer price revisions if the firm does not operate any business in the state where its headquarters is located.

We can draw two implications from the resulting estimates. First, when firms locate in an environment with a higher level of political corruption, they have an incentive to move their businesses to an area associated with less corrupt activities. This incentive should include the benefits from reduced initial returns and the potential to raise more capital during an IPO. Nevertheless, Jared D Smith (2016) argues that geographic concentration should be an outcome variable driven by local corruption. Consistent with this argument, we document a negative relationship between a corrupt environment and business concentration in the state where a firm has its headquarters (significant at 1%).[7] Second, the results indicate an investor's ability to evaluate IPOs in politically corrupt environments. In particular, when a firm conducts no business in the state where its headquarters is located, there is less adverse impact from corruption and investors have better access to information to value a new issue. In contrast, investors require more time and incur higher costs to acquire information when an IPO is subject to the risks of a corrupt environment (and the firm has a higher concentration of its operations in the environment), resulting in greater initial returns. Thus, the results also support our first hypothesis.

[7] We use accumulated politically corrupt environment rates, while Smith (2016) uses the corruption rates only in the firm year. However, we reach the same conclusion as his study and provide robust evidence that political corruption incentivizes firms to move their business outside the states where their headquarters are located. The results are available on request.

2.5.5 Insiders' wealth

One of the principal objectives for firms that go public is to take pre-IPO shareholders' net wealth gains into account. Loughran and Ritter (2002) argue that insiders gain by retaining shares when the stock price is high (the wealth effect) and lose by selling shares with high first-day returns that result in a substantial amount of "money left on the table" (the dilution effect). Such wealth gains, however, are affected by offer price revisions and initial returns. Pre-IPO shareholders benefit from a higher market price, which results from higher levels of revision and underpricing, depending on the number of shares that pre-IPO shareholders retain. However, pre-IPO shareholders suffer losses from low offer prices that do not reach intrinsic values (the dilution effect). Thus, the overall effect of offer price revisions and initial returns on insiders' wealth depends on the portion of shares they retain and sell during IPOs. Consequently, net wealth gains using the dilution effect abstracted from the insiders' wealth effect can appropriately capture the prosperity of pre-IPO shareholders. As a result, we are particularly interested in investigating how a corrupt environment affects insiders' wealth.

We use *insider wealth dummy* as the dependent variable that indicates whether pre-IPO shareholders benefit from wealth gains. The measure we employ is the wealth effect minus the dilution effect.[8] In addition to the variables that interest us, we incorporate three control variables: *initial return residuals*, *IPO float ratio*, and the *logarithm of IPO proceeds*. The *initial return residuals* variable is obtained by regressing IPO first-day returns on measures of corrupt environments and is used as a proxy for the separate effect of underpricing on insiders' wealth (Cook, Kieschnick and Van Ness (2006); Cooney et al. (2015)). We include *IPO float ratio* because Cook, Kieschnick and Van Ness (2006) document that it influences underpricing and has an impact on insiders' gains. Following Alexander Ljungqvist, Nanda and Singh (2006), we control for the *logarithm of IPO proceeds*, given that an underwriter is likely to increase an offer's size to entice sentiment investors. Such investors determine the marginal valuation of an issue in the

[8] Following Bradley and Jordan (2002), Cook et al. (2006), and Cooney et al. (2015), we define insiders' wealth effect as (closing price of the first trading day minus midpoint filing range)*number of shares retained by pre-IPO shareholders. The dilution effect is calculated as (closing price of the first trading day minus offer price)*number of shares issued in the offering. We measure the number of shares retained by pre-IPO shareholders as (number of shares outstanding after offering minus number of shares issued in the offering).

market. We perform a logistic regression to investigate the association between insiders' wealth and political corruption. The results are tabulated in Table 7.

The results from the control variables are in line with Cook, Kieschnick and Van Ness (2006) and Cooney et al. (2015). Specifically, we find that increasing the amount of proceeds during an IPO and decreasing the IPO float ratio can improve the likelihood of net gains for pre-IPO shareholders. The initial return residuals also exhibit a positive relationship with insiders' wealth and are significant at 1%. Importantly, we observe that a corrupt environment does not reduce insiders' wealth because the variable of interest *PCR* shows a positive sign (0.109) with a high statistical significance level of 1%. This finding is consistent with the wealth maximizing hypothesis proposed by Ang and Brau (2003), which states that insiders use strategies to conceal the number of shares they sell in the aftermarket in order to boost their own benefits. In addition, Loughran and Ritter (2002) argue that issuers do not feel upset about the "money left on the table" because the perceived wealth gains exceed the losses from first-day returns. Our results support this finding and particularly indicate that a corrupt business environment may not be a concern for insiders because they still benefit from the shares they retain before an IPO.

2.5.6 Matching estimation

The results from Panel B of Table 1 show that most of our control variables are significantly different between the low and high corrupt environments. The statistical differences appear in majority of IPO and firm characteristics. Thus, the differences in IPO characteristics in two group of corrupt areas could be caused directly or indirectly by the local political corrupt environment, or by unobserved heterogeneity between IPO issuers. In this section, we use propensity score matching (PSM) to control for such observable differences. Using a propensity score matching analysis, we can statistically compare the outcome of a treated observation (IPO firm) with an effect (high corrupt environment) to the same observation but not treated based on a number of covariates. We define our treatment observations as those IPOs from high corrupt areas and include rich sets of covariates from the previous analysis. We extend our testing by controlling for year, industry, and region effects. Table 8 presents the results of the average of effect of the treatment on the treated (ATET) on the IPO initial returns for the newly listed firms from a high corrupt environment versus those from a low corrupt environment. The ATET is positive, as the sign is 4.088, and strongly significant at 1%, indicating that IPO firms in a high corrupt environment incur high initial returns compared to their counterparts in a low corrupt environment. This finding supports our primary hypothesis and is aligned with the results from Table 3.

2.5.7 Post-IPO financial performance

The market timing for a firm to go public is important because it often relates to a firm's future performance. Çolak and Günay (2011) suggest that high quality firms are likely to wait to go public so that they do so strategically in a wave; thus, newly listed firms have lower productivity and perform worse after listings if they conduct their IPOs earlier (Christoffersen, Nain and Tang, 2010). Shantanu Banerjee, Güçbilmez and Pawlina (2016) document that early movers in a hot IPO market have better growth opportunities and higher valuations when they go public. Following their research, we question whether a firm goes public when the market is surrounded by political corruption that could affect post-IPO growth.

In order to answer this question, we create three measures as proxies of firm financial performance. We first follow Khanna and Palepu (2000) and use Tobin's Q ratio. We measure the ratio as (market value of equity + book value of preferred stock + book value of debt)/(book value of assets), where the price on the last trading day in the year is used for calculating the equity's market value. Second, we use capital expenditure and profitability, following Shantanu Banerjee, Güçbilmez and Pawlina (2016), to link the operating performance of an IPO firm. In order to explore how a corrupt environment around an IPO affects post-IPO performance, we use percentage changes of three performance indicators separately, from the IPO year to one year after the IPO, as dependent variables. We add a number of IPO characteristics as control variables that can have an impact on post-IPO performance (e.g., Shantanu Banerjee, Güçbilmez and Pawlina (2016)). The number of observations falls because of the availability of accounting data and the status of IPO firms (e.g., delisting and M&A). As in prior analyses, we control for year, industry, and regional effects in the regressions. The results are presented in Table 9.

First, setting the level of Tobin's Q in column 1 in the IPO year as a benchmark, newly listed firms experience reduced Q ratios one year after going public under conditions of greater political corruption. Further, we observe a negative coefficient, -5.306 and significant at the 5% level, on the *PCR* in column 2, suggesting that going public in a corrupt environment hampers an IPO firm's investment growth in the public capital market. Finally, when we focus on the changes in profitability in column 3, the variable of interest, *PCR*, displays a negative effect on IPO firms' profitability. In terms of economic significance, one standard deviation increase in *PCR* results in 0.018%, 5.32%, and 2.374% reductions respectively of Tobin's Q, capital expenditure, and profitability for IPO firms one year after listing compared with the IPO year. In unreported results, we fail to find such evidence in consecutive financial years (e.g., the second and third years), which suggest that going public under politically corrupt environments, firms suffer from the negative growth only for a limited period.

Overall, the results are consistent with the view that newly listed firms not only suffer losses from the process of going public; they also experience negative growth for a short period immediately after going public.

2.5.8 Alternative measures and robustness tests

This study's main conclusion is that IPO issuers in politically corrupt environments incur higher initial returns; thus, a significant amount of money is "left on the table." In this section, in order to explore further the sensitivity of IPO underpricing in politically corrupt environments, we consider alternative measures of corrupt environments for IPO firms and use a different conviction database. We also derive full sets of control variables from our baseline regressions in Table 3. The results are presented in Table 10.

In prior analyses, we measure corrupt environments from 1976 to the IPO year to account for accumulated local corruption. First of all, we use an alternative measure that only considers rent-seeking business environments from the time that the IPO firms are established in column 1. In other words, the new measure is defined as the number of convictions per million population for the period beginning with each firm's founding year to its IPO year. The intuition behind this measure is that the impact on an IPO in a politically corrupt environment may begin from the date of the firm's establishment.

Because of the limited conviction data provided by the DOJ, firms that started their businesses before 1976 are deemed to have begun from 1976 in our analysis. Next, in column 2, we use raw convictions without population adjustment as the political corruption measure. Furthermore, we exclude firms with headquarters located in Washington D.C. in column 3. Eliminating IPOs from Washington D.C. in our sample implies that such IPOs (which experience an extremely high level of corruption) do not drive our results. As seen in Table 9, the resulting coefficients of *PCR* through columns 1 to 3 remain positive and significant at the conventional levels, providing alternative evidence that a corrupt environment results in higher IPO initial returns.

In column 4, we use the survey-based corruption measure developed by Boylan and Long (2003). In order to ensure the measure's effectiveness, we extend the sample to five years after the survey was conducted, which was 1999. The result, as expected, shows that a corrupt environment is positively associated with IPO underpricing. It presents a positive coefficient of 2.194 on the variable of interest and is statistically significant at the 5% level.

In order to underpin our results, we apply an alternative conviction data source from Transactional Records Access Clearinghouse (TRAC). The advantage of using TRAC is that the database employs the Freedom of Information Act (FOIA) to request raw information from different agencies such as the FBI to ensure the quality of the data. However, TRAC only provides conviction data from 1986. Thus, we start measuring corrupt environments from 1986 to the IPO years. The *PCR* coefficient in column 5 shows that, even if we use an alternative conviction data source, political corruption has a positive (1.199) and significant (at the 1% level) impact on initial returns.

Prior studies consider white-collar crime as additional rent-seeking behavior in the private sector (e.g., Murphy, Shleifer and Vishny (1993)). Such crime could be a plausible factor that influences our results because the related convictions have a more direct impact on firm performance (e.g., Dechow, Sloan and Sweeney (1996); Baucus and Baucus (1997); Marciukaityte et al. (2006)). Arguably, one would suspect that white-collar crime, other than political corruption, causes high IPO first-day returns. Given this concern, we collect white-collar crime conviction data from TRAC and duplicate the measures used for political corruption. Column 6 presents the results of regressions that we run to investigate the association between white-collar crime and IPO performance. From the empirical evidence, we find that no significant relationship exists between white-collar crime and initial returns. Further, the variable of interest *PCR* remains positive and significant at the 5% level. In fact, unlike government behaviors, which attract greater public attention, white-collar crime tends to be implicit. The firm and investor will not realize the crime until the offender is arrested. Thus, in this situation, IPO issuers have no incentive to conceal information; moreover, the investor does not pay attention to such a crime. Consequently, white-collar crime should not be a factor that potentially influences our results.

2.5.9 Other sensitivity checks

In order to provide further robust evidence, we use the following sensitivity checks. 1) Because of the nature of the distribution of the right-tail skewness and leptokurtosis of IPO initial returns, we follow prior studies (e.g., Leone, Rock and Willenborg (2007); Gounopoulos et al. (2017)) and use the natural logarithm of one plus the variable (*Log (1+IPO Initial Returns)*) to pursue the improved explanatory power of political corruption on IPO initial returns. 2) We construct event periods for corrupt environments using conviction data from the DOJ. We particularly use PCR in the year of issuing, three- and five-year windows to evaluate political corruption around the IPO of each newly listed firm in the state where its headquarters is located. In all tests, the variable of interest, *PCR*, remains positive and significant, suggesting a strong pattern that IPO firms in a politically corrupt environment incur higher initial returns on their first day of trading. Relevant tables are provided in the Internet Appendix.

2.6 Discussion

2.6.1 How do pre-IPO shareholders achieve positive returns in a corrupt environment?

A question that arises from our study is how do pre-IPO shareholders achieve positive returns in a corrupt environment from the shares they retain, even though political corruption imposes costs for firms that access the IPO market by raising first-day returns? In this regard, we argue that an underwriter's promotional efforts during an IPO play an important role in a corrupt environment.

As discussed, a pre-IPO shareholder's wealth gains depend on a greater number of IPO offer price revisions and reduced underpricing relative to the portion of shares that the shareholder retains. However, our evidence indicates that political corruption increases first-day returns, meaning that insiders continue to suffer losses in a corrupt environment. Thus, the results from section 5.2 give the impression that insiders' wealth gains may mainly derive from a greater number of offer price revisions, a circumstance that is attributed to the promotional efforts of underwriters (Cook, Kieschnick and Van Ness, 2006). As our third hypothesis postulates, a corrupt environment results in a greater number of revisions because of the demand for information production in the market. On the one hand, underwriters can incorporate information into offer prices (Corwin and Schultz, 2005); moreover, a greater number of revisions brings benefits to issuers (e.g., the ability to raise more capital) (Cooney et al., 2015). On the other hand, investment banks need to balance the level of underpricing (Beatty and Ritter, 1986), especially when corruption is more prevalent. In addition, underwriters may lose investors' participation when aftermarket returns are low (i.e., collecting information in a corrupt environment is costly and investors do not receive sufficient compensation); thus, when IPOs are undervalued, other potential customers (i.e., IPO issuers) may attempt to free ride on this problem and decide not to hire the same banks in the future. This situation forces underwriters to make their best efforts to support IPOs in politically corrupt environments.

Further, in order to examine the IPO relationship with corruption levels separately, our unreported results (which are available on request) use gross spread, which has total fees as a proxy, and selling concession, which represents the reward for selling an issue. These results reveal that both compensation measures are positively associated with corrupt environments. This finding suggests that issuers pay more for underwriters when political corruption is more prevalent. There is also evidence that investment banks regard their prestige in the market as an important symbol for future business. Thus, higher fees provide underwriters with greater incentives to secure their reputations and increase the number of offer price revisions for IPO firms that are from corrupt environments. Insiders, in turn, benefit from price revisions. Success in conducting IPOs in corrupt environments can promote the status of banks and thereby attract more issuers that are conducting business in such environments. Thus, reciprocal relationships between IPO firms and investment banks increase the likelihood of positive wealth gains for pre-IPO shareholders in corrupt environments.

2.6.2 Why firms go public under high politically corrupt environments?

One would consider that firms go public when market uncertainty is high (e.g., with politically corrupt environment) may represent a successful market timing. In this case, the negative post-offering growth is merely a by-product for such activities. Thus, there would cause confounding results while explaining the market timing and IPO outcomes (e.g., positive insider wealth gains and the unfavorable growth). In this section, we argue that there are multiple reasons and incentives for firms to decide whether to go public when there is a high corrupt environment.

First, firms going public is necessarily rather than randomly. On the one hand, conducting the IPO could be a result of raising more capital for the future development. For instance, Bernstein (2015) empirically documents that firms with the enhanced access to the public capital market gain external opportunities to acquire other firms in order to increase their innovations and attract new human capital; while they continue to focus more on conventional investments. On the other hand, institutional investors, such as venture capitalists, may prefer to take the advantage of going public to exit the investees because of high returns (e.g., Amit, Brander and Zott (1998)); whereas some firms choose to use the IPO to facilitate merge and acquisition (M&A) activities (e.g., Celikyurt, Sevilir and Shivdasani (2010); Gill and Walz (2016)). Therefore, under some circumstances, firms have to go public even if they realize there is a high politically corrupt environment around the scheduled IPO date.

Further, as the evidence shows in the Section 5.4, shifting the business concentration away from the HQ location to an area where there is a lower corrupt environment significantly reduces initial returns. However, going public is a rigorous process which basically requires firms with stable financial and managerial systems. Once a firm decides to move the operation from the HQ location to other areas, it may take a long time to deploy the new business strategy. Furthermore, tax incentive tends to be another reason which explains why firms do not change the location of their headquarter easily. Dyreng, Lindsey and Thornock (2013) reveal that tax factors play an important role on firms' decisions regarding whether to locate subsidiaries in Delaware, because firms can gain values in tax heavens (e.g., Choy, Lai and Ng (2017)). In other words, firms can benefit from local tax regulations. They may choose the location of headquarters or subsidiaries based on the local tax levels. In the long run, it is costly for firms to change the location of the headquarters in order to decrease IPO underpricing, because they would lose more by paying additional taxes. Thus, changing the business concentration to exchange for the reduced initial returns could be extraordinarily costly and may negatively affect the IPO process. As indicated in the Section 6.1, underwriters charge higher fees for taking firms to go public in politically corrupt environments. In this scenario, if firms which cannot sustain the costly change in the business concentration, they have to rely on the underwriters. Therefore, regardless of market timing consideration, pre-IPO shareholders that can manage positive gains in a corrupt environment may largely attribute to underwriters' promotion efforts, even though the insiders can also reach the wealth-maximizing target through strategically concealing their shareholdings (Ang and Brau, 2003).

Overall, firms go public under a high corrupt environment may not be a well-scheduled market timing because those firms incur higher initial returns and experience lower post-offering financial performance.

2.7 Conclusion

This study provides initial evidence about the relationship between corrupt environments and IPO short-term performance in the US. Such evidence is consistent with the argument that political corruption increases the uncertainty of business environments and has a negative impact on firm performance. Specifically, we reveal that political corruption is associated with a higher incidence of IPO initial returns but only for small-sized firms and firms that conduct their business in the states where their headquarters are located. This finding translates into a US$1.13 million loss for a mean-sized issuer in the form of excessive first-day returns. Moreover, the finding is consistent with information asymmetry as the cause of a higher incidence of underpricing. In this regard, such information asymmetry is due to the market uncertainty that surrounds IPOs in corrupt environments. We also address the role of underwriters in risk-adverse markets. We document that those investment banks with higher rankings reduce the incidence of underpricing for issuers that operate in politically corrupt environments. This finding is in accord with the banks' certification roles in terms of IPOs. Further, in accordance with the information-acquisition model, underwriters revise offer prices frequently in corrupt environments because there is a greater demand to gather information from informed investors. Moreover, our examination of pre-IPO shareholders' wealth gains shows that issuers in rent-seeking environments may not worry about “money left on the table” because they still benefit from the shares they retain. Finally, we find that firms that go public in politically corrupt environments experience negative post-IPO growth.

In our analysis, we consider an endogeneity issue. This occurs because, in our sample, the locations of IPO firms' headquarters are not randomly selected. We conduct an instrumental variable approach and use educational level, racial heterogeneity, and the Gini ratio as instruments for political corruption. In robustness tests, we employ alternative ways to measure corrupt environments, use the TRAC database for corruption convictions, and exclude factors that may drive our analysis (e.g., we exclude IPOs from Washington D.C). All the analyses strengthen our propositions and suggest that political corruption in the US raises costs for firms that go public by leaving millions of dollars “on the table.”

In response to the questions raised in the introduction, the findings of this paper imply the following. (1) Political corruption aggregates the uncertainty of the business environment and creates barriers for firms that wish to enter the public capital market through higher first-day returns. (2) Underwriters play an important role in eliminating market information asymmetry and can reduce the incidence of underpricing for issuers in corrupt environments. (3) Corruption has a positive impact on pre-IPO shareholders' wealth because of investment banks' promotional efforts. (4) Firms suffer negative post-IPO financial performance if they go public in environments with high levels of political corruption. Overall, our study uncovers the significance of corruption in terms of IPO initial returns. Thus, our study adds to the growing literature on the dynamics of how political corruption affects firm performance.

Table 1 Summary statistics

The table provides summary statistics for the main control variables used in the analysis. The sample consists of initial public offerings from 1990 to 2015 in the US stock market. The variables contain IPO characteristics collected from Thomson One., including IPO initial returns, calculated as the percentage changes from first day closing price to offer price. IPO revision is defined as changes from offer price to midpoint of the initial price range over offer price. The missing values from database trim the sample size on IPO revision, Revision UP dummy and insider's wealth dummy. All variables are defined in the appendix.

Panel A: Summary statistics

Variables	N	Mean	Std.Dev	5th	Median	95th
IPO Initial returns	4670	19.01	34.81	-7	8.13	85.65
Firm Age	4670	15.05	20.51	1	8.00	62.00
Total Assets	4670	344.50	1511.46	7.31	75.02	1267.03
Leverage	4670	0.37	0.30	0.06	0.30	0.84
High-tech	4670	0.40	0.49	0	0	1
Top-tier	4670	0.73	0.45	0	1	1
Venture Capital	4670	0.44	0.50	0	0	1
Auditor	4670	0.67	0.47	0	1	1
Nasdaq	4670	0.72	0.45	0	1	1
Share Overhang	4670	3.58	4.23	0.37	2.81	8.49
No. of Bookrunners	4670	1.31	0.90	1	1	3
Hot market	4670	0.73	0.45	0	1	1
Revision	4670	0.11	14.27	-23.80	0	20.80
Revision dummy	4670	0.65	0.48	0	1	1
Insider's wealth dummy	4337	0.55	0.50	0	1	1
Proceeds	4337	88.94	324.53	6	41.6	272
ΔTobin's Q	3424	-0.03	1.66	-0.81	-0.18	1.05
ΔCapX	3951	205.62	3159.77	-68.00	45.80	579
ΔProf	4014	73.00	1549.64	-192.70	1.72	240.70

Panel B: Summary Statistics by Corrupt and Non-Corrupt areas

Variables	Low-corrupt areas	High-corrupt areas	difference in means (p-value)
IPO Initial returns	15.73	21.73	0.00
Firm Age	15.67	14.53	0.03
Total Assets	348.44	341.24	0.44
Leverage	0.38	0.36	0.03
High-tech	0.35	0.44	0.00
Top-tier	0.72	0.74	0.07
Venture Capital	0.39	0.49	0.00
Auditor	0.62	0.70	0.00
Nasdaq	0.70	0.74	0.00
Share Overhang	3.78	3.74	0.00
No.of Bookrunners	1.27	1.35	0.00
Hot market	0.77	0.69	0.00
Revision	-0.45	0.58	0.00
Revision dummy	0.62	0.67	0.00
Insider's wealth dummy	0.53	0.57	0.01
Proceeds	84.50	92.60	0.21
ΔTobin's Q	0.02	-0.06	0.07
ΔCapX	245.80	171.72	0.23
ΔProf	104.24	46.61	0.12

Table 2 Sample IPOs based on the level of political corrupt environment

The table reports ten IPOs in the top/lower level of political corrupt environment in the US, based on the headquarter locations. The sample consists of initial public offerings from 1990 to 2015 in the US stock market. IPO first-day returns are calculated as the percentage changes from first day closing price to offer price. We use political corruption rate (PCR) calculated as number of corruption convictions from 1976 to the IPO year divided by the population in millions in the same period to proxy the local corrupt environment. Panel A presents the ten IPOs in states with the lowest corrupt environment; Panel B presents the ten IPOs from the states with top corrupt environment, but excluding the district of Washington D.C. We take the lowest (highest) PCR value for IPOs from the different states as examples in Panel A and B. The average IPO initial returns and average money left on the table in the IPO year are obtained from Jay Ritter's website.

Panel A

IPO date	Issuer	Firm Age	Headquarter Location	PCR	Initial returns (%)	Avg. initial returns% (IPO year)	Money left on the table ($, million)	Avg. money left on the table (IPO year ,$, million)
03/09/1995	Fort Howard Corp	76	Wisconsin	1.41	1.58	21.2	3.91	4.90
06/24/2004	Cabelas Inc	43	Nebraska	1.31	30	12.3	46.88	3.86
08/22/1991	BMC West Corp	4	Idaho	1.23	0	11.9	0	1.5
10/24/1996	Uroquest Medical Corp	0	Utah	1.15	0	17.2	0	6.76
02/12/1999	Bottomline Technologies Inc	10	New Hampshire	1.14	57.46	71.2	25.40	37.11
07/24/2000	Evoke Communications Inc	3	Colorado	1.11	0	56.4	0	29.81
12/17/1997	Information Advantage Software	5	Minnesota	1.04	1	14.0	0.2	4.56
12/14/2004	Cascade Microtech Inc	21	Oregon	0.71	-1.79	12.3	-13.28	3.86
04/27/1993	Interlinq Software Corp	11	Washington	0.55	0	12.8	0	3.52
03/10/1993	Specialty Paperboard Inc	25	Vermont	0.42	3.85	12.8	1.16	3.52

Panel B

IPO date	Issuer	Firm Age	Headquarter Location	PCR	Initial returns (%)	Avg. initial returns% (IPO year)	Money left on the table ($, million)	Avg. money left on the table (IPO year ,$, million)
02/04/2000	eOn Communications Corp	9	Mississippi	6.41	91.67	56.4	39.64	29.81
05/23/1991	Envoy Corp	10	Tennessee	5.72	42.50	11.9	8.5	1.5
09/26/1990	Matrix Service Co	6	Oklahoma	5.49	1.63	10.8	0.42	0.34
01/30/2006	H&E Equipment Services Inc	45	Louisiana	5.46	28.33	12.1	55.78	3.95
11/26/1997	Brass Eagle Inc	2	Alaska	5.38	13.64	14.0	3.41	4.56
06/13/2006	Verasun Energy Corp	5	South Dakota	5.01	30.43	12.1	127.73	3.95
06/26/2000	Stratos Lightwave Inc	54	Illinois	4.71	62.5	56.4	89.46	29.81
09/27/1994	Baby Superstore Inc	24	South Carolina	4.70	93.06	9.6	45.65	1.43
02/09/1998	Duane Reade Inc	38	New York	4.35	30.67	21.9	36.83	5.25
08/08/2013	Cvent Inc	14	Virginia	4.33	56.76	21.1	66.75	7.94

Table 3 Impact of public corruption on IPO initial returns

The table displays the effects of political corruption on IPO initial returns. The sample consists of initial public offerings from 1990 to 2015 in the US stock market. The dependent variable is the IPO initial return, calculated as the percentage changes from first day closing price to offer price. We use political corruption rate (PCR) calculated as number of corruption convictions from 1976 to the IPO year divided by the population in millions in the same period to proxy the local corrupt environment. In Panel A, column (1) to (4) use ordinary least square (OLS) regressions, and column (5) and (6) use Two-Stage Least Squares (2SLS) approaches. The instrumental variables used are Education Level, Racial Heterogeneity, and Gini Ratio at the state level, where the first stage of the IV model is suppressed for brevity. All regressions include year and industry controls, and a region control. In Panel B, we define large firms are with total assets in the IPO year at the top quartile of our sample, then the rest belong to small firms. PCR is winsorized at the 1% at each tail. One, two and three asterisks denote statistical significance at the 10%, 5% and 1% level. The t-statistics are included in the parentheses and are reported for heteroscedasticity robust standard errors clustered by year and industry. All variables are defined in Appendix A.

Panel A

	OLS				2SLS	
	(1)	(2)	(3)	(4)	(5)	(6)
PCR	1.135***	1.227***	1.278***	1.252***	2.233**	1.873*
	(2.67)	(2.88)	(3.03)	(2.99)	(2.08)	(1.83)
Firm Age		-2.683***	-2.550***	-2.636***	-2.618***	-2.146***
		(-5.68)	(-5.81)	(-6.12)	(-6.23)	(-5.39)
Total Assets		3.277***	3.253***	3.224***	3.194***	1.587**
		(3.30)	(3.17)	(3.24)	(3.28)	(2.01)
Leverage		-15.378***	-14.050***	-13.950***	-14.021***	-7.313**
		(-3.61)	(-3.63)	(-3.74)	(-3.76)	(-2.45)
High-tech		8.796***	7.920***	7.495***	7.522***	5.756***
		(4.49)	(4.53)	(4.51)	(4.53)	(4.23)
Top-tier			0.454	0.118	0.158	0.183
			(0.34)	(0.09)	(0.12)	(0.15)
Venture capital			3.791*	3.298	3.348	2.982
			(1.80)	(1.62)	(1.64)	(1.59)
Auditor			-0.392	-0.156	-0.152	0.314
			(-0.38)	(-0.15)	(-0.14)	(0.31)
Nasdaq			1.200	1.174	1.161	1.379
			(1.20)	(1.20)	(1.19)	(1.49)
Share Overhang				0.571**	0.568**	0.475**
				(2.03)	(2.03)	(1.99)
No. of Bookrunners				-1.446***	-1.441***	-1.330**
				(-2.67)	(-2.66)	(-2.57)
Hot Market				5.877	5.950	3.357
				(1.52)	(1.56)	(1.05)

Revision						0.712***
						(7.79)
Intercept	-1.478	2.846	0.724	1.465	-0.892	1.401
	(-0.30)	(0.54)	(0.12)	(0.25)	(-0.13)	(0.22)
Hausman Test (p-value)					0.35	0.34
Year control	Yes	Yes	Yes	Yes	Yes	Yes
Industry control	Yes	Yes	Yes	Yes	Yes	Yes
Region control	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R2	0.1604	0.1936	0.1956	0.2009	0.2003	0.2760
Number of observations	4670	4670	4670	4670	4670	4670

Panel B Small VS large firms

	Large Firms	Small Firms
PCR	-0.150	1.484**
	(-0.25)	(2.52)
Intercept	1.613	-4.097
	(0.18)	(-0.61)
Year control	Yes	Yes
Industry control	Yes	Yes
Region control	Yes	Yes
Adjusted R2	0.2952	0.1834
Number of observations	1167	3503

Table 4 Impact of public corruption on IPO offer price revisions

The table displays the effect of political corruption on IPO offer price revisions. The sample consists of initial public offerings from 1990 to 2015 in the US stock market. The dependent variables are IPO absolute revisions in column (1), IPO revisions in column (2), and a positive revision dummy in Column (3), respectively. The IPO revision is measured as the percentage change from offer price to the midpoint of the initial price range; the absolute revision is the absolute value of IPO revisions; the positive revision dummy is a binary variable indicating whether offer price exceeds the midpoint of the initial price range. We use political corruption rate (PCR) calculated as number of corruption convictions from 1976 to the IPO year divided by the population in millions in the same period to proxy the local corrupt environment. Column (1) and (2) use ordinary least square (OLS) regressions. Column (3) uses a logistic regression. All regressions include year and industry controls, and a region control. One, two and three asterisks denote statistical significance at the 10%, 5% and 1% level. Revisions and PCR are winsorized at 1% at each tail, respectively. The t-statistics are included in the parentheses and are reported for heteroscedasticity robust standard errors clustered by both year and industry. All variables are defined in Appendix A.

	OLS		Logit Model
	(1)	(2)	(3)
Dependent Variable:	Absolute Revisions	Revisions	Revision Dummy
PCR	-0.242	0.433**	0.103***
	(-1.45)	(2.10)	(3.25)
Firm Age	-0.132	-0.622***	-0.144***
	(-0.62)	(-3.04)	(-3.40)
Total Assets	0.019	2.064***	0.213***
	(0.10)	(8.50)	(4.99)
Leverage	1.932	-8.552***	-1.459***
	(1.43)	(-5.78)	(-7.38)
High-tech	0.876**	2.370***	0.223**
	(2.42)	(3.39)	(2.17)
Top-tier	2.839***	-0.018	-0.232**
	(5.62)	(-0.03)	(-2.37)
Venture capital	1.613***	0.383	-0.070
	(5.60)	(0.64)	(-0.69)
Auditor	0.481	-0.582	-0.150**
	(1.32)	(-1.50)	(-2.29)
Nasdaq	1.412***	-0.256	-0.174*
	(4.36)	(-0.51)	(-1.83)
Share Overhang	0.055	0.129*	0.004
	(1.15)	(1.78)	(0.51)
No. of Bookrunners	0.060	-0.142	0.038
	(0.35)	(-0.52)	(0.70)
Hot Market	0.552	3.602**	0.515**
	(0.84)	(2.46)	(2.09)
Intercept	7.463***	-3.818*	0.716**
	(2.88)	(-1.83)	(2.18)
Year control	Yes	Yes	Yes
Industry control	Yes	Yes	Yes
Region control	Yes	Yes	Yes
Adjusted R2/Pseudo R2	0.0482	0.1203	0.062
Number of observations	4670	4670	4670

Table 5 Analysis of underwriter's role on IPO initial returns in a corrupt environment

The table displays the joint effects of political corruption and underwriter's reputation in a corrupt environment on IPO initial returns using ordinary least squares (OLS) regressions. The sample consists of initial public offerings from 1990 to 2015 in the US stock market. The dependent variable is the IPO initial return, calculated as the percentage changes from first day closing price to offer price. We use political corruption rate (PCR) calculated as number of corruption convictions from 1976 to the IPO year divided by the population in millions in the same period to proxy the local corrupt environment. Column (1) uses underwriter's rank from Jay Ritter's website. The rank ranges from score 0 to 9, where 0 means the lowest reputation of an investment bank and 9 indicates the highest reputation of the bank. Column (2) limits the only top-tier underwriters who have a score above (including) 7. All regressions include year and industry controls, and a region control. One, two and three asterisks denote statistical significance at the 10%, 5% and 1% level. PCR is winsorized at the 1% at each tail. The t-statistics are included in the parentheses and are reported for heteroscedasticity robust standard errors clustered by year and industry. All variables are defined in Appendix A.

	(1)	(2)
PCR	2.623***	2.862***
	(3.27)	(3.12)
PCR*Top-tier	-0.184**	
	(-1.99)	
PCR*Underwriter Rank		-0.246**
		(-2.28)
Firm Age	-2.605***	-2.593***
	(-6.05)	(-5.99)
Total Assets	3.221***	3.398***
	(3.24)	(3.70)
Leverage	-13.877***	
	(-3.77)	(-3.78)
High-tech	7.458***	7.493***
	(4.50)	(4.56)
Top-tier	5.134**	
	(2.52)	
Underwriter Rank		0.506*
		(1.79)
Venture capital	3.267	3.417*
	(1.60)	(1.71)
Auditor	-0.071	-0.033
	(-0.07)	(-0.03)
Nasdaq	1.160	1.268
	(1.19)	(1.28)
Share Overhang	0.571**	0.573**
	(2.03)	(2.05)
No. of Bookrunners	-1.448***	-1.545***
	(-2.67)	(-2.85)
Hot Market	5.965	6.037
	(1.55)	(1.56)
Intercept	-2.435	-2.815
	(-0.39)	(-0.45)
Year control	Yes	Yes
Industry control	Yes	Yes
Region control	Yes	Yes
Adjusted R2	0.2014	0.2015
Number of observations	4670	4670

Table 6 Political corruption, IPO initial return, and business operation concentration

The table displays the joint effects of business operation concentration in the headquarter state and political corruption on IPO initial returns using ordinary least squares (OLS) regressions. The sample consists of initial public offerings from 1990 to 2015 in the US stock market. The dependent variables are the IPO initial return in column (1), calculated as the percentage changes from first day closing price to offer price; and the IPO offer price revision in column (2), measured as the percentage change from offer price to the midpoint of the initial price range. We use political corruption rate (PCR) calculated as number of corruption convictions from 1976 to the IPO year divided by the population in millions in the same period to proxy the local corrupt environment. Following Garcia and Norli (2012), we define the percentage of IPO firm's business operation concentration in the headquarter as number of times that the HQ state has been mentioned over all other states in the earliest 10-K (or relevant) report after Initial Public Offering. Thus, the variable Operation Concentration% range from zero to one, where zero means that the IPO issuer does not have any businesses in the HQ state and one indicates that the firm has fully concentrated operations in the headquarter location. All regressions include year and industry controls, and a region control. One, two and three asterisks denote statistical significance at the 10%, 5% and 1% level. PCR is winsorized at the 1% at each tail. The t-statistics are included in the parentheses and are reported for heteroscedasticity robust standard errors clustered by year and industry. All variables are defined in Appendix A.

	(1)	(2)
	Initial returns	Revisions
PCR	-0.313	-0.242
	(-0.42)	(-0.55)
Operation Concentration%	-7.994*	-4.011**
	(-1.72)	(-2.42)
PCR*Operation Concentration%	3.140**	1.356**
	(2.11)	(1.99)
Firm Age	-2.833***	-0.618**
	(-5.21)	(-2.33)
Total Assets	4.729***	2.497***
	(3.64)	(8.91)
High-tech	-14.724***	-9.124***
	(-2.86)	(-6.59)
Leverage	9.014***	3.263***
	(4.55)	(3.45)
Auditor	1.145	-0.160
	(0.79)	(-0.35)
Top-tier	1.331	-0.022
	(0.76)	(-0.03)
Venture capital	5.654**	1.115
	(2.23)	(1.52)
Nasdaq	2.394*	-0.907**
	(1.71)	(-1.99)
Share Overhang	0.472	0.120
	(1.52)	(1.39)
No. of Bookrunners	-2.139***	-0.385
	(-3.22)	(-1.21)
Hot Market	7.595*	5.038***
	(1.80)	(3.64)
Intercept	-9.957	-7.788
	(-0.83)	(-1.50)
Year control	Yes	Yes
Industry control	Yes	Yes
Region control	Yes	Yes
Adjusted R2	0.2151	0.1509
Number of observations	3031	3031

Table 7 Analysis of insider wealth gains in a corrupt environment

The table displays the effects of political corruption on IPO insider's wealth gains using a logistic regression. The sample consists of initial public offerings from 1990 to 2015 in the US stock market. The dependent variable is insider wealth gains dummy, taking one if insider's wealth effects are greater than the dilution effects, otherwise is zero. Following Cook et al. (2006), wealth effect is defined as (closing price of the first trading day-midpoint filling range) *number of shares retained by pre-IPO shareholders; dilution effect is defined as (closing price of the first trading day-offer price) *number of shares issued in the offering. Number of shares retained by pre-IPO shareholder are calculated as (number of shares outstanding after offering - number of shares issued in the offering). We use political corruption rate (PCR) calculated as number of corruption convictions from 1976 to the IPO year divided by the population in millions in the same period to proxy the local corrupt environment. All regressions include year and industry controls, and a region control. One, two and three asterisks denote statistical significance at the 10%, 5% and 1% level. PCR is winsorized at the 1% at each tail. The t-statistics are included in the parentheses and are reported for heteroscedasticity robust standard errors clustered by year and industry. All variables are defined in Appendix A.

	Insider's wealth dummy
PCR	0.109***
	(3.32)
Initial return residuals	0.079***
	(8.95)
Ln (Proceeds)	0.406***
	(7.61)
Float Ratio	-6.679***
	(-8.89)
Intercept	-0.851*
	(-1.91)
Year control	Yes
Industry control	Yes
Region control	Yes
Pseudo R2	0.3176
Number of observations	4337

Table 8 Endogeneity control-Propensity score matching

The table displays the analysis of the effect of high corrupt environment on the IPO initial returns, controlling for the endogeneity of IPO firm HQ selection using propensity score matching. The sample consists of initial public offerings from 1990 to 2015 in the US stock market. The dependent variable is the IPO initial return, calculated as the percentage changes from first day closing price to offer price. The variables used for matching include: Firm age, Total assets, Leverage, High-tech, Top-tier, Venture capital, Auditor, Nasdaq, Share overhang, No. of Bookrunners and Hot market. The matching includes year and industry controls, and a region control. One, two and three asterisks denote statistical significance at the 10%, 5% and 1% level. Z-statistics are included in the parentheses. All variables are defined in Appendix A.

	IPO initial returns
ATET	4.088***
High corrupt environment vs. Low corrupt environment	(2.72)
Year control	Yes
Industry control	Yes
Region control	Yes
Number of observations	4670

Table 9 Political corruption and post-IPO financial performance

The table displays the effects of IPO firms that went public under political corruption on the post-offering financial performance using ordinary least square (OLS) regressions. The sample consists of initial public offerings from 1990 to 2015 in the US stock market. The dependent variable is the change of a post-IPO financial performance measure from one year after offering to the IPO year. We define Tobin's Q as (Market value of equity + book value of preferred stock + book value of debt)/ (book value of assets), where we calculate the market value of equity using the stock price on the last trading day of the fiscal year. Thus, ΔTobin's Q is the percentage change of Q ratio from IPO year to one year after going public. ΔCapX (ΔProf) is the change of capital expenditure (profitability) between the year of listing and one year after listing, where profitability is calculated as the ratio of EBITDA over total assets. We use political corruption rate (PCR) calculated as number of corruption convictions from 1976 to the IPO year divided by the population in millions in the same period to proxy the local corrupt environment. All regressions include year and industry controls, and a region control. One, two and three asterisks denote statistical significance at the 10%, 5% and 1% level. PCR and ΔTobin's Q are winsorized at the 1% at each tail; ΔCapX and ΔProf are winsorized at 5% at each tail. The t-statistics are included in the parentheses and are reported for heteroscedasticity robust standard errors clustered by year and industry. All variables are defined in Appendix A.

	(1)	(2)	(3)
	ΔTobin's Q	ΔCapX	ΔProf
PCR	-0.018**	-5.306**	-2.368*
	(-1.99)	(-2.23)	(-1.68)
Firm Age	0.004	-13.368***	-5.485***
	(0.34)	(-4.97)	(-3.17)
Total Assets	-0.007	4.901	4.935**
	(-0.69)	(1.60)	(2.33)
Leverage	0.138**	-75.962***	-38.784***
	(2.59)	(-7.03)	(-4.82)
High-tech	0.057	-30.161***	-9.110**
	(1.30)	(-3.36)	(-2.52)
Top-tier	-0.054**	-11.227*	-14.830***
	(-2.22)	(-1.67)	(-3.94)
Venture capital	0.076**	-1.728	15.722***
	(2.26)	(-0.23)	(4.27)
Auditor	0.007	-9.145	-4.359
	(0.35)	(-1.63)	(-1.26)
Nasdaq	-0.056**	11.382	-6.531
	(-2.51)	(1.60)	(-1.51)
Share Overhang	-0.006**	-1.315*	-0.152
	(-2.32)	(-1.81)	(-0.64)
No.of Bookrunners	0.023	-8.397***	-1.182
	(1.18)	(-2.86)	(-0.46)
Hot Market	0.054	-5.835	-7.642
	(0.67)	(-0.44)	(-0.78)
Intercept	0.017	142.021***	8.775
	(0.12)	(3.85)	(0.49)
Year control	YES	YES	YES
Industry control	YES	YES	YES
Region control	YES	YES	YES
Adjusted R2	0.1155	0.0654	0.0502
Number of observations	3424	3951	4014

Table 10 Alternative Measures of Corrupt Environment and Robustness Checks

The table displays the effects of political corruption with alternative measures on IPO initial returns using ordinary least squares (OLS) regressions. The sample consists of initial public offerings from 1990 to 2015 in the US stock market. The dependent variable is IPO initial return, calculated as the percentage changes from first day closing price to offer price. We use political corruption rate (PCR) calculated as number of corruption convictions (e.g., Department of Justice (DOJ)) from IPO firm founding year to the IPO year divided by the population in millions in the same period to proxy the local corrupt environment in column (1). In column (2), we use number of raw convictions. We exclude IPO firms located in Washington D.C. from the sample in column (3). In column (4), we adopt corruption measures from Boyland and Long (2003). In column (5) and (6), we measure political corruption rate (PCR) and white-collar crime environment using conviction date from Transactional Records Access Clearinghouse (TRAC). All regressions include year and industry controls, and a region control. One, two and three asterisks denote statistical significance at the 10%, 5% and 1% level. PCR and WCC are winsorized at the 1% at each tail, except in column (4). The t-statistics are included in the parentheses and are reported for heteroscedasticity robust standard errors clustered by year and industry. All variables are defined in Appendix A.

Dependent variable: IPO Initial Returns	(1) PCR from founding year	(2) Raw conviction	(3) Excl. Washington D.C.	(4) Boyland and Long (2003)	(5) TRAC	(6) TRAC
PCR	1.423***	0.002**	1.332***	2.194**	1.199***	1.058**
	(3.28)	(2.07)	(3.22)	(2.08)	(3.05)	(2.35)
WCC						0.076
						(0.92)
Firm Age	-2.424***	-2.605***	-2.688***	-3.102***	-2.621***	-2.610***
	(-5.64)	(-5.18)	(-6.20)	(-5.27)	(-6.04)	(-6.02)
Total Assets	3.247***	3.251***	3.231***	3.652***	3.277***	3.256***
	(3.27)	(5.76)	(3.19)	(5.82)	(3.30)	(3.27)
Leverage	-14.002***	-13.875***	-14.034***	-20.850***	-13.855***	-13.881***
	(-3.77)	(-4.43)	(-3.72)	(-8.06)	(-3.73)	(-3.74)
High-tech	7.485***	7.407***	7.461***	7.335***	7.556***	7.602***
	(4.48)	(6.19)	(4.54)	(5.01)	(4.60)	(4.66)
Top-tier	0.070	0.087	0.109	-0.841	0.089	0.130
	(0.05)	(0.08)	(0.08)	(-0.61)	(0.07)	(0.10)
Venture capital	3.243	3.233***	3.243	1.379	3.214	3.324
	(1.59)	(2.95)	(1.62)	(1.10)	(1.56)	(1.63)
Auditor	-0.222	-0.224	-0.150	0.007	-0.173	-0.127
	(-0.21)	(-0.23)	(-0.14)	(0.01)	(-0.16)	(-0.12)
Nasdaq	1.153	1.282	1.161	1.340	1.214	1.227
	(1.17)	(1.29)	(1.17)	(1.16)	(1.24)	(1.26)
Share Overhang	0.574**	0.579**	0.573**	1.260***	0.575**	0.574**
	(2.05)	(2.11)	(2.03)	(4.56)	(2.03)	(2.03)
No. of Bookrunners	-1.471***	-1.456**	-1.422***	1.714	-1.481***	-1.472***

	(-2.72)	(-2.52)	(-2.61)	(0.66)	(-2.75)	(-2.73)
Hot Market	5.881	5.840**	5.964	3.762	5.843	5.815
	(1.51)	(2.23)	(1.53)	(1.14)	(1.52)	(1.51)
Intercept	-0.115	3.848	1.403	0.029	2.528	0.898
	(-0.02)	(0.91)	(0.24)	(0.00)	(0.44)	(0.16)
Year control	Yes	Yes	Yes	Yes	Yes	Yes
Industry control	Yes	Yes	Yes	Yes	Yes	Yes
Region control	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R2	0.2022	0.2007	0.2024	0.2166	0.2010	0.2009
Number of observations	4670	4670	4655	3339	4670	4670

Appendix A Variable definitions

Variable	Description (data source)
Corrupt environment measures	
PCR	The local politically corrupt environment for firms at the time of IPO and is measured as number of corruption convictions per million population from 1976 to IPO year. (DOJ& The US Census Bureau)
IPO and firm characteristics	
IPO initial returns	Presented as a percentage and calculated as (first day closing price-offer price)/offer price*100. (Thomson One Banker)
Firm Age	Natural logarithm of 1 plus company's age prior to the IPO. Company's age prior to the IPO is defined as the calendar time of the IPO minus calendar time of the company's founded date. (Jay Ritter's website)
Total Assets	Nature logarithm of firm total assets before IPO. (Compustat)
Leverage	The ratio of total liabilities over total assets before the IPO. (Compustat)
High-tech	Dummy variable taking one if the IPO firm belong to high-tech industry, otherwise is zero. (Thomson One)
No. of Bookrunners	The number of bookrunners is the number of managers assuming the responsibility of the bookrunner's role. (Thomson One Banker)
Overhang	The ratio of shares retained by the insider. Calculated as the number of shares retained by the block shareholders over total number of shares in the IPO
Underwriter rank	A continues variable ranges from score 0 to 9 indicating underwriter's reputation, where 0 is the lowest and 9 is the highest. (Jay Ritter's website)
Top-Tier	Dummy variable taking 1 if underwriter's rank is equal to 7 or above, otherwise is 0. (Jay Ritter's website)
Venture capital	Dummy variable used to indicate whether the IPO has venture capital support. 1 denotes the IPO is VC-backed, otherwise is 0. (Thomson One)
Auditor	A binary variable taking one if the IPO is audited by the top-4 auditing agents, otherwise is zero. (Thomson One)
Nasdaq	Dummy variable taking one if the IPO was listed on Nasdaq exchange, otherwise is zero. (Thomson One)
Share Overhang	The ratio of pre-IPO shares retained over shares filed during IPO, where pre-IPO shares retained contains shares owned by pre-IPO shareholder that are not sold in the offering and share filed includes primary and secondary shares. (Thomson One)
No. of Bookrunners	Number of bookrunners working together during Initial Public Offering. (Thomson One)
Revision	Presented as a percentage and calculated as (offer price minus the mid-point of the initial filling price range)/the mid-point of the initial filling price range. (Thomson One)
Revision dummy	Dummy variable taking one if final offer price is greater than the mid-point of the initial filling price range. (Thomson One)

Insider's wealth dummy	Dummy variable taking one if insider's wealth effects are greater than the dilution effects, otherwise is zero Following Cook et al. (2006), wealth effect is defined as (closing price of the first trading day-midpoint filling range) *number of shares retained by pre-IPO shareholders; dilution effect is defined as (closing price of the first trading day-offer price) *number of shares issued in the offering. (Thomson One)
Proceeds	Natural logarithm of total proceeds in millions. (Thomson One)
Hot market	Dummy variable taking one if the IPO was listed during hot IPO market, otherwise is zero. (Own calculation)
ΔTobin's Q	Percentage change of Tobin's Q from IPO year to one year after IPO. Following Khanna and Palepu (2000), we measure the ratio as (market value of equity + book value of preferred stock + book value of debt)/(book value of assets), where the price on the last trading day in the year is used for calculating the equity's market value. (Compustat)
ΔCapX	Percentage change of capital expenditures from IPO year to one year after IPO. (Compustat)
ΔProf	Percentage change of net sales from IPO year to one year after IPO. (Compustat)

Business operation concentration variables

Operation Concentration (%)	Following Garcia and Norli (2012), we count number of times that the headquarter location mentioned in the IPO firm's 10-K report in sections "Item 1: Business," "Item 2: Properties," "Item 6: Consolidated Financial Data," and "Item 7: Management's Discussion and Analysis.". If the first 10-K report after IPO is not available, we follow their study to use alternative Forms 10-K/A, 10-K405, 10-KSB,10-KT,10KSB,10KSB40,10KT405 to count states, whichever is firstly available after IPO. We measure an IPO firm's operation concertation in the HQ state as the ratio of how many times that the headquarter location is mentioned over all states mentions in the report. The variable ranges from 0 (IPO firm has zero business in the HQ state) to 1 (IPO firm has fully concentrated businesses in the HQ state) .

Instrumental variables

Education Level	Share of people that are above 25 years old with more than 4 years collage attended in each state. (The US Census Bureau)
Racial	The variable is used to measure the ethnic diversity in the US in each census year since 1990. Racial heterogeneity $=1 - \sum s_i^2$, where s_i is the share of race group i in each state in the US. The race shares from 1990 are composed of white, black, American Indian, Eskimo or Aleut, Asian, Pacific Islander and others. The race shares from 2000 and 2010 are composed of white, black or African American, American Indian and Alaska native, Asian, native Hawaiian and another Pacific Island, and some other race. The data is from the US Census.
Gini Ratio	The Gini coefficient in each state. Data is from US Census Bureau. (the US Census Bureau)

Appendix B: First stage of 2SLS approach

The table displays the first-stage results of Table 3 regressions which uses two-state least square approaches. The sample consists of initial public offerings from 1990 to 2015 in the US stock market. We use political corruption rate (PCR) calculated as number of corruption convictions from 1976 to the IPO year divided by the population in millions in the same period to proxy the local corrupt environment. We regress all variables used in Table 3 and a list of PCR determinants. The instrumental variables used are Education Level, Racial Heterogeneity, and Gini Ratio at the state level. All regressions include year and industry controls, and a region control. PCR is winsorized at the 1% at each tail. One, two and three asterisks denote statistical significance at the 10%, 5% and 1% level. The t-statistics are included in the parentheses and are reported for heteroscedasticity robust standard errors clustered by year and industry. All variables are defined in Appendix A.

	(1) 1st Stage	(2) 1st Stage with revision
Firm Age	0.006	0.006
	(0.44)	(0.50)
Total Assets	0.018	0.015
	(1.49)	(1.29)
Leverage	0.060	0.070*
	(1.46)	(1.73)
High-tech	-0.006	-0.008
	(-0.23)	(-0.34)
Top-tier	-0.025	-0.025
	(-0.75)	(-0.75)
Venture capital	-0.019	-0.020
	(-0.65)	(-0.67)
Auditor	-0.037	-0.036
	(-1.30)	(-1.28)
Nasdaq	0.063**	0.064**
	(2.41)	(2.42)
Share Overhang	0.003	0.003
	(1.18)	(1.15)
No. of Bookrunners	0.006	0.006
	(0.24)	(0.24)
Hot Market	-0.074	-0.078
	(-1.28)	(-1.35)
Education	-6.203***	-6.199***
	(-10.49)	(-10.49)
Racial heterogeneity	2.954***	2.952***
	(12.29)	(12.28)
Gini ratio	15.321***	15.318***
	(11.80)	(11.83)
Revision		0.001
		(1.29)
Intercept	-3.667***	-3.664***
	(-6.21)	(-6.22)
Year control	Yes	Yes
Industry control	Yes	Yes
Region control	Yes	Yes
Adjusted R2	0.4758	0.4759
Number of observations	4670	4670

Appendix C Correlation matrix

Variables		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Firm Age	(1)	1											
Total Assets	(2)	0.296	1										
Leverage	(3)	0.288	0.372	1									
High-tech	(4)	-0.115	-0.092	-0.211	1								
Top-tier	(5)	0.117	0.457	0.049	0.078	1							
Venture capital	(6)	-0.195	-0.095	-0.294	0.296	0.187	1						
Auditor	(7)	0.041	0.225	-0.004	0.078	0.193	0.166	1					
Nasdaq	(8)	-0.082	-0.207	-0.223	0.150	0.092	0.247	0.053	1				
Share Overhang	(9)	0.019	0.169	0.006	0.152	0.127	0.114	0.062	-0.011	1			
No. of Bookrunners	(10)	0.134	0.469	0.201	-0.042	0.065	-0.048	0.170	-0.201	0.096	1		
Hot Market	(11)	-0.116	-0.342	-0.106	0.048	-0.050	-0.074	-0.182	0.093	-0.056	-0.500	1	
Revision	(12)	-0.065	0.076	-0.172	0.155	0.100	0.088	0.023	0.034	0.086	-0.033	0.085	1

Appendix D Summary Statistics for Political Corruption Environment Measures by the States

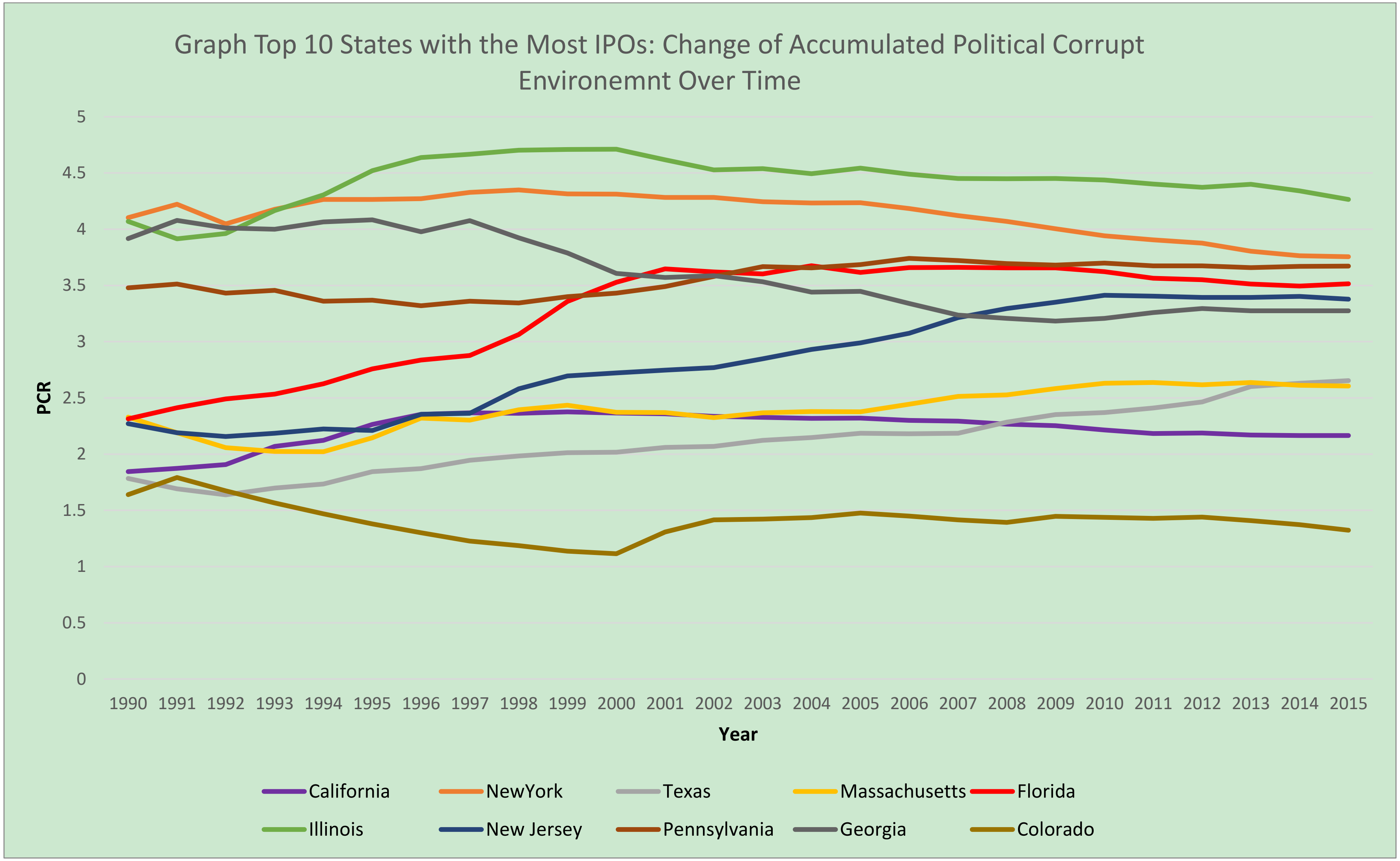
The table provides the summary statistics for the political corruption environment measures for each US state based on the issuers' headquarter location. The sample consists of initial public offerings from 1990 to 2015 in the US stock market. We use political corruption rate (PCR) calculated as number of corruption convictions from 1976 to the IPO year divided by the population in millions in the same period to proxy the local corrupt environment. The data is organized by the median of PCR.

States	N	Mean	Median	Std.Dev	Min	Max
District of Columbia	15	44.399	45.075	5.411	31.866	50.241
Mississippi	12	5.977	5.947	0.209	5.729	6.410
Alaska	2	5.316	5.316	0.096	5.249	5.384
Tennessee	73	5.192	5.296	0.426	4.520	5.971
Louisiana	17	4.705	4.717	0.636	3.943	6.299
Oklahoma	41	4.525	4.473	0.459	3.997	5.493
South Dakota	6	4.436	4.388	0.293	4.222	5.011
Illinois	161	4.426	4.494	0.251	3.914	4.711
South Carolina	17	4.399	4.507	0.423	2.912	4.695
New York	320	4.216	4.264	0.139	3.755	4.349
Alabama	21	4.034	4.034	0.101	3.868	4.268
Georgia	124	3.870	3.978	0.260	3.207	4.083
North Dakota	2	3.821	3.821	0.000	3.821	3.821
Montana	5	3.517	3.515	0.447	3.080	4.184
Pennsylvania	175	3.472	3.432	0.135	3.319	3.740
Virginia	102	3.350	3.290	0.305	2.945	4.377
West Virginia	3	3.052	3.114	0.198	2.830	3.212
New Mexico	6	3.020	2.976	0.101	2.906	3.173
Ohio	88	2.951	2.871	0.277	2.598	3.618
Florida	218	2.908	2.835	0.399	2.313	3.675
Kentucky	11	2.774	2.679	0.393	2.438	3.574
Maryland	91	2.691	2.674	0.255	2.293	3.327
Wyoming	3	2.559	2.658	0.174	2.357	2.661
New Jersey	178	2.551	2.358	0.422	2.156	3.412
Delaware	5	2.322	2.063	0.745	1.602	3.168
Massachusetts	350	2.321	2.328	0.195	2.021	2.637
Rhode Island	7	2.280	2.316	0.168	2.108	2.530
Maine	4	2.264	2.315	0.313	1.888	2.538
California	1237	2.236	2.301	0.159	1.844	2.375
Connecticut	99	2.234	2.196	0.091	2.121	2.523
Hawaii	3	2.214	2.097	0.449	1.836	2.711
Missouri	42	2.161	2.072	0.261	1.871	2.713
Indiana	46	1.996	1.975	0.046	1.947	2.116
Texas	419	1.971	1.946	0.267	1.638	2.653
Nevada	33	1.961	1.943	0.142	1.740	2.357
Kansas	16	1.950	1.975	0.110	1.766	2.122
Arkansas	8	1.915	1.945	0.185	1.609	2.091
Arizona	65	1.874	1.829	0.215	1.580	2.553
Idaho	11	1.810	1.905	0.387	1.231	2.316
Michigan	52	1.804	1.789	0.056	1.737	1.963
North Carolina	78	1.735	1.731	0.058	1.640	1.868
Nebraska	13	1.663	1.734	0.168	1.313	1.828
Wisconsin	35	1.511	1.488	0.093	1.410	1.690
Iowa	18	1.460	1.470	0.060	1.309	1.541
Colorado	127	1.365	1.380	0.162	1.114	1.792
Utah	36	1.322	1.286	0.154	1.149	1.721
New Hampshire	16	1.310	1.270	0.132	1.136	1.493
Minnesota	103	1.095	1.081	0.046	1.037	1.193
Washington	106	0.832	0.780	0.185	0.536	1.117
Oregon	43	0.785	0.781	0.038	0.711	0.862
Vermont	7	0.499	0.418	0.104	0.418	0.651

Appendix E Summary statistics for political corruption measures by year

The table provides the summary statistics for the political corruption environment measures on the year basis. The sample consists of initial public offerings from 1990 to 2015 in the US stock market. We use political corruption rate (PCR) calculated as number of corruption convictions from 1976 to the IPO year divided by the population in millions in the same period to proxy the local corrupt environment.

States	N	Mean	Median	Std. Dev	Min	Max
1990	97	2.336	1.844	1.106	0.536	5.971
1991	213	2.744	2.189	2.316	0.598	31.866
1992	326	2.406	2.027	1.040	0.570	5.729
1993	405	2.510	2.069	1.088	0.418	5.942
1994	359	2.637	2.122	2.128	0.558	37.045
1995	359	2.579	2.264	2.239	0.651	39.982
1996	556	2.665	2.355	1.904	0.753	41.054
1997	358	2.889	2.367	3.089	0.586	41.687
1998	200	3.044	2.362	4.343	0.725	45.075
1999	340	2.915	2.375	3.569	0.733	47.382
2000	287	2.675	2.366	2.857	0.753	48.605
2001	48	2.578	2.358	0.949	1.017	5.018
2002	47	2.915	2.768	1.040	1.015	4.603
2003	38	2.553	2.326	0.821	1.151	4.538
2004	135	3.290	2.319	5.851	0.711	50.241
2005	110	2.796	2.376	1.006	0.727	5.264
2006	127	3.518	2.444	5.896	1.084	49.331
2007	121	2.617	2.293	0.769	1.096	4.450
2008	15	2.834	2.283	1.018	1.392	4.679
2009	32	2.953	2.582	1.111	1.099	4.631
2010	65	2.699	2.369	0.877	1.102	4.585
2011	55	2.571	2.182	0.905	1.099	4.520
2012	75	2.536	2.187	0.814	0.862	6.299
2013	109	2.574	2.169	0.853	1.084	4.400
2014	139	2.582	2.612	0.767	1.085	4.539
2015	54	2.623	2.553	0.812	1.140	4.377



Graph Top 10 States with the Most IPOs: Change of Accumulated Political Corrupt Environemnt Over Time
PCR
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Year
California
NewYork
Texas
Massachusetts
Florida
Illinois
New Jersey
Pennsylvania
Georgia
Colorado

Internet Appendix A: Impact of public corruption on IPO initial returns using an alternative return measure

The table displays the effects of political corruption on IPO initial returns. The sample consists of initial public offerings from 1990 to 2015 in the US stock market. The dependent variable is Log (1+IPO initial return). The initial return is calculated as the percentage changes from first day closing price to offer price. We use political corruption rate (PCR) calculated as number of corruption convictions from 1976 to the IPO year divided by the population in millions in the same period to proxy the local corrupt environment. All regressions include year and industry controls, and a region control. PCR is winsorized at the 1% at each tail. One, two and three asterisks denote statistical significance at the 10%, 5% and 1% level. The t-statistics are included in the parentheses and are reported for heteroscedasticity robust standard errors clustered by year and industry. All variables are defined in the appendix A.

Dependent variables: Log (1+IPO Initial Return)	(1)	(2)	(3)	(4)
PCR	0.011***	0.012***	0.013***	0.013***
	(2.67)	(2.88)	(3.03)	(2.99)
Firm Age		-0.027***	-0.025***	-0.026***
		(-5.68)	(-5.81)	(-6.12)
Total Assets		0.033***	0.033***	0.032***
		(3.30)	(3.17)	(3.24)
Leverage		-0.154***	-0.140***	-0.139***
		(-3.61)	(-3.63)	(-3.74)
High-tech		0.088***	0.079***	0.075***
		(4.49)	(4.53)	(4.51)
Top-tier			0.005	0.001
			(0.34)	(0.09)
Venture capital			0.038*	0.033
			(1.80)	(1.62)
Auditor			-0.004	-0.002
			(-0.38)	(-0.15)
Nasdaq			0.012	0.012
			(1.20)	(1.20)
Share Overhang				0.006**
				(2.03)
No. of Bookrunners				-0.014***
				(-2.67)
Hot Market				0.059
				(1.52)
Intercept	0.985***	1.028***	1.007***	1.015***
	(19.90)	(19.37)	(17.24)	(17.65)
Year control	YES	YES	YES	YES
Industry control	YES	YES	YES	YES
Region control	YES	YES	YES	YES
Adjusted R2	0.1604	0.1936	0.1956	0.2009
Number of observations	4670	4670	4670	4670

Internet Appendix B: Impact of public corruption on IPO initial returns using alternative PCR measures

The table displays the effects of political corruption with alternative measures on IPO initial returns using ordinary least squares (OLS) regressions. The sample consists of initial public offerings from 1990 to 2015 in the US stock market. The dependent variable is IPO initial return, calculated as the percentage changes from first day closing price to offer price. We use political corruption rate (PCR) calculated as number of corruption convictions from 1976 to the IPO year divided by the population in millions in the same period to proxy the local corrupt environment. Column 1 uses PCR measured in the IPO year. Column 2 and 3 use PCR measured in 3-year and 5-year windows before IPO year (including issuing year), respectively. All regressions include year and industry controls, and a region control. One, two and three asterisks denote statistical significance at the 10%, 5% and 1% level. PCR is winsorized at the 1% at each tail. The t-statistics are included in the parentheses and are reported for heteroscedasticity robust standard errors clustered by year and industry. All variables are defined in the Appendix A.

	(1)	(2)	(3)
	PCR: IPO year	Lagged PCR:3Ys	Lagged PCR: 5Ys
PCR	0.711**	1.316***	1.376***
	(2.46)	(3.98)	(4.04)
Firm Age	-2.637***	-2.613***	-2.603***
	(-6.08)	(-6.07)	(-6.05)
Total Assets	3.259***	3.253***	3.235***
	(3.29)	(3.30)	(3.27)
Leverage	-13.975***	-14.056***	-14.036***
	(-3.74)	(-3.76)	(-3.75)
High-tech	7.453***	7.547***	7.558***
	(4.52)	(4.56)	(4.53)
Top-tier	0.069	0.063	0.087
	(0.05)	(0.05)	(0.06)
Venture capital	3.247	3.305	3.327
	(1.58)	(1.62)	(1.63)
Auditor	-0.222	-0.289	-0.264
	(-0.21)	(-0.27)	(-0.25)
Nasdaq	1.176	1.227	1.170
	(1.20)	(1.25)	(1.19)
Share Overhang	0.573**	0.571**	0.577**
	(2.02)	(2.03)	(2.05)
No.of Bookrunners	-1.467***	-1.464***	-1.460***
	(-2.71)	(-2.69)	(-2.70)
Hot Market	5.758	5.862	5.861
	(1.48)	(1.51)	(1.52)
Intercept	2.500	-0.405	-0.406
	(0.43)	(-0.07)	(-0.07)
Year control	Yes	Yes	Yes
Industry control	Yes	Yes	Yes
Region control	Yes	Yes	Yes
Adjusted R2	0.2010	0.2026	0.2025
Number of observations	4670	4670	4670

Internet Appendix C: Impact of pollical corruption on underwriter's compensation

The table displays the effects of political corruption on underwriter's compensations using ordinary least squares (OLS) regressions. The sample consists of initial public offerings from 1990 to 2015 in the US stock market. The dependent variables are the logarithm of the dollar gross spread in Column (1) and the logarithm of the selling concessions in Column (2), respectively. PCR is political corruption rate and defined as number of convictions per million population in each state. All regressions include year and industry controls, and a region control. One, two and three asterisks denote statistical significance at the 10%, 5% and 1% level. PCR is winsorized at the 1% at each tail; Ln ($Selling Concession) is winsorized at 5% at each tail. The t-statistics are included in the parentheses and are reported for heteroscedasticity robust standard errors clustered by year and industry. All variables are defined in Appendix A.

	Ln ($Gross Spread)	Ln ($Selling Concession)
	(1)	(2)
PCR	0.016**	0.012*
	(1.98)	(1.71)
Firm Age	0.108***	0.080***
	(7.68)	(7.38)
Underwriter Rank	0.049***	0.044***
	(4.65)	(5.04)
Venture capital	-0.097***	-0.081***
	(-4.65)	(-5.09)
High-tech	0.010	0.006
	(0.51)	(0.39)
Ln (number of IPOs_180, filing date)	-0.073*	-0.061**
	(-1.89)	(-2.01)
Intercept	0.657***	0.410***
	(3.71)	(2.96)
Year control	Yes	Yes
Industry control	Yes	Yes
Region control	Yes	Yes
Adjusted R2	0.4515	0.4625
Number of observations	4665	4515

Chapter 3 Stay concentrated to survive

3.1 Introduction

Initial public offerings (IPOs) play an important role in the financial system, enabling companies to raise equity finance and contributing to growth for States of operations. The number of U.S. States that IPOs operate spreads all over the span. Although the fluctuation in IPO operations range is well expected the underlying impact of geographically distributed business interests are not well known. Firms choose to expand operations to different areas, becoming more geographically dispersed, to access local resources, such as labor forces, market share, customers, and suppliers. Previous literature (i.e. Gao, Ng and Wang (2008); Garcia and Norli (2012); Giroud (2013); Platikanova and Mattei (2016); Addoum, Kumar and Law (2017)) has revealed that such business dispersion in different U.S. States influences corporate performance.

Specifically, Gao, Ng and Wang (2008) argue that firms with divisions in different regions nationwide experience valuation discounts, because of higher agency problems among those firms. Garcia and Norli (2012) find that stock returns tend to be lower for geographically dispersed firms. Some studies also suggest that firms with spatially distributed business interests significantly affect corporate decisions. Landier, Nair and Wulf (2009) document that geographic dispersion raises issues around management decision-making in relation to internal human resources (e.g. employee dismissal) and investments (e.g. division divesture), which go against shareholder interests. Giroud (2013) indicates that firms prefer to build plants near their headquarters in order to perform closer monitoring and increase productivity. Moreover, geographically dispersed business interests have a negative impact on earnings forecasts due to the spatially distributed firm-specific information (e.g., Platikanova and Mattei (2016); Addoum, Kumar and Law (2017)). Nevertheless, those studies only address the short-term effects of corporate dispersion on firm performance. Thus, in this paper, we question whether geographically dispersed business interests have an impact on a firm’s long-term performance, which involves mortality rates.

Our study focuses on the initial public offering (IPO) market because going public represents a transfer of ownership structure from the private to the public, which exposes firms to greater market risk and more rigorous scrutiny from investors and financial regulators. Moreover, managers in newly listed firms also experience enhanced challenges from the public capital market to make decisions that take more responsibility for a variety of market participants, including shareholders. Hence, the viability of public firms in periods subsequent to their IPO becomes particularly important. Fama and French (2004) report a significant delisting rate (44%) between 1980 and 1991 for firms in the first ten years after being newly listed due to poor corporate performance (see, for example, Loughran and Ritter (2002) and Demers and Joos (2007) for similar findings). Evidence shows that a variety of firm and offering characteristics at the time of going public are deemed as important signals for a firm's future performance and therefore affect post-offering survival times, including venture capitalist participation (Jain and Kini, 2000), strategic and cornerstone investors (Espenlaub et al., 2016), and the CEO's working experience (Gounopoulos and Pham, 2018). However, the relationship between a firm's geographical characteristics and its post-IPO survival remains unexplored.

Thus, this study investigates the impact of a firm's geographic dispersion at the time of going public on its survivability in periods subsequent to the offering. We obtain a comprehensive sample of newly listed firms from 1994 to 2012 in the U.S. stock market. Following previous studies (e.g. Garcia and Norli (2012); Platikanova and Mattei (2016); Addoum, Kumar and Law (2017)), we use a text-based measure by counting state names from the operations-related sections in the Form 10-K to proxy firms' geographically dispersed business interests. We construct a normalized Herfindahl–Hirschman Index (HHI) to indicate to what extent a firm is geographically dispersed across different U.S. states at the time of going public. This study is focused on geographical dispersion in the U.S., which provides us with a comparatively more homogenous, within-country environment (e.g. in relation to political and regulatory considerations), and discounts additional risks stemming from overseas dispersion (e.g. international diversification).

Agency theory refers to the conflict of interests arising between an agent (e.g. managers) and the principal (e.g. shareholders) in which self-interested agents seek private benefits from either financial or non-financial incentives and eventually omit to maximize shareholder value (Jensen and Meckling, 1976). In this study, we argue that geographic dispersion hampers information flow within the organization, which negatively affects management decision-making, thereby exacerbating agency conflicts and giving rise to poor corporate performance and IPO failure. Geographically dispersed firm-specific information results in a reduced ability for managers to completely summarize operating information (Addoum, Kumar and Law, 2017), and increases information disparity between insiders and outsiders (Platikanova and Mattei, 2016). Distance affects information quality when it is transferred between different locations (Petersen and Rajan, 2002), and causes agency conflicts because of the low observability of managers' behaviors (John, Knyazeva and Knyazeva, 2011). Thus, information asymmetry tends to be higher in geographically dispersed firms, which inherently increases internal and external monitoring costs. Shareholders may experience monitoring difficulties in those firms, resulting in moral hazard issues for managers in making decisions. Further, geographically dispersed firms face various challenges due to differing market conditions in states where firms have business interests. Managerial decision-making in geographically dispersed firms can be more flexible, depending on the operating environment (see, for example, Landier, Nair and Wulf (2009)). As a result, such firms feature more volatile operating environments, which aggravate the moral hazard problem (Clifford W Smith and Watts (1992); Himmelberg, Hubbard and Palia (1999)). Managers who do not align with shareholder interests are likely to make inefficient decisions that result in IPO failure (see, for example, Gounopoulos and Pham (2018)). Therefore, we should expect geographic dispersion to increase the probability of firm failure risk in the post-offering period.

We find strong evidence to support our conjecture. By implementing a Cox proportional-hazards (CPH) model, we reveal that more geographically dispersed firms are likely to fail and experience shorter survival times in periods subsequent to going public. When categorizing a firm by its degree of geographic dispersion, we find that lower levels of dispersion make it 0.756 times less likely that a firm will fail compared to a firm with higher levels of dispersion. The results are consistent when using nonparametric methodologies. Moreover, we document a similar negative geographic-dispersion effect when investigating a firm's post-IPO operating performance growth, which may serve as alternative evidence to explain the low survival rates among such firms.

We also reveal two additional effects of geographic dispersion on IPO survival. First, consistent with the notion that firms competing in the same states exhibit comparable information that enables shareholders to perform better monitoring and managers to make more efficient decisions, we find that IPO failure risks tend to be lower for firms with geographical similarities in the same industry. Second, we reveal that firms with spatially distributed business interests that are closely associated with local economic shocks experience lower failure risks, which indicates more efficient information collection and process analysis on their part.

We further explore possible mechanisms for the failure of geographically dispersed IPO firms. Because of the evolution of information technologies in some industries (e.g. hard information environments), information collection increasingly relies on more impersonal means, which explains the increased distance between banks and the firms they service (Petersen and Rajan, 2002). On the other hand, in a soft information environment, personal interactions dominate information processing, which makes the information more difficult to transfer and verify. Thus, geographically dispersed firms in a soft information setting experience greater information asymmetry because distance has a larger impact on information flow and the means of information acquisition (Petersen, 2004). Moreover, Landier, Nair and Wulf (2009) argue that information quality should be homogenous when the information is quantifiable (e.g. hard information). Hence, we should not expect there to be a link between IPO firm failure risk and geographical dispersion in firms operating in hard information environments. Conversely, consistent with the high information-asymmetry argument from previous studies (e.g., Platikanova and Mattei (2016)), we find that the failure risks among dispersed newly listed firms are more pronounced in soft information environments. The evidence is consistent with our conjecture that information flow matters to geographically dispersed firms for survival in post-offering periods.

Because information collection in a soft information environment mainly relies on personal interactions, managerial decisions are more likely to be affected by social concerns. We find that geographically dispersed IPO firms are more likely to fail in small communities in a soft information setting. This result supports the argument that social factors affect managerial decision-making by affording more consideration to personal relationships, thereby exacerbating agency conflicts and corporate performance issues

(Landier, Nair and Wulf, 2009). In more concentrated firms, shareholders can better monitor management behaviors and ameliorate such managerial social concerns. Taken together, the evidence is consistent with our hypothesis that information asymmetry causes agency conflicts in relation to managerial decision-making, resulting in IPO failures in geographically dispersed firms.

Finally, using a text-based measure to proxy the sizes of firms' headquarters, we reveal a positive relationship between the degree of business concentration around the headquarters location and post-IPO survival. Regardless of geographic dispersion, the evidence implies an important function for HQ size on firm performance, which is consistent with notions from previous studies (e.g. Eisenhardt (1985); Hill, Hitt and Hoskisson (1992); Collis, Young and Goold (2007)).

We make several contributions to geography and IPO-based literature. Previous studies document various negative impacts on firm performance stemming from geographic dispersion, including firm valuation discount (Gao, Ng and Wang, 2008), lower stock returns (Garcia and Norli, 2012), and biased and inaccurate earnings forecasts (Platikanova and Mattei, 2016), and inefficient corporate decision-making (Landier, Nair and Wulf, 2009). To better understand how geographic dispersion affects corporate performance, we contribute to this stream of literature by addressing how newly listed firms with business interests heavily distributed across different U.S. states experience increased failure risk in the periods subsequent to the offering, with the ultimate consequence that firms are bankrupted or liquidated. To the best of our knowledge, we provide the first study to associate geography and corporate survival.

Previous studies focus on a variety of firm and offering characteristics that affect IPO survival, such as firm age, size, and risk factors (Hensler, Rutherford and Springer, 1997), the participation of venture capitalists (Jain and Kini, 2000), strategic and cornerstone investors (Espenlaub et al., 2016), and CEO's working experience (Gounopoulos and Pham, 2018). However, it is unclear how geography affects the survivability of newly listed firms. In this regard, our results, using a novel dataset on firms' geographically distributed business interests, could help to explain a sizable portion of firm failures on the IPO market.

Our study is also closely related to the work of Landier, Nair and Wulf (2009). They find that geographically dispersed firms are less employee-friendly as a result of information limitations in a soft information environment where information asymmetry is high, and managers make decisions according to their social standings in small communities that are potentially against shareholder interests. This study replicates their research design and updates their work to show that information constraints and managerial social concerns in geographically dispersed newly listed firms result in corporate failures.

Finally, our results produce several implications that are applicable in the financial marketplace. First, geographically dispersed firms are usually large in size (Garcia and Norli, 2012), which draws investors' interests in the market. However, our results show that those dispersed firms exhibit a high tendency to failure in periods subsequent to going public. Thus, investors can reply on the observable factor of a firm's geographically dispersed business interests at the time of the offering event to anticipate the implications of corporate failure for further valuation. Second, even though rapid expansion of a business to different geographical areas brings some financial benefits to firms, such as gaining greater market share and achieving higher sales, managers and shareholders need to take the side effects into account. For instance, compromised information from remote business operations deflects managers' judgments from what might be rational, while closer proximity between headquarters and divisions enables managers to make more frequent trips to offer constructive advice for firm development (e.g. Giroud (2013)). Newly listed firms can benefit from running more concentrated businesses, in which failure risks are likely to be reduced.

The rest of this paper is organized as follows: Section 2 develops our primary hypothesis, while Section 3 discusses the data and methodologies. Section 4 presents our primary findings, including robustness checks. Finally, Section 5 provides a conclusion to the study.

3.2 Geographic dispersion and IPO survival

Previous literature discusses the relation between geographic dispersion and stock returns. Pirinsky and Wang (2006) find that the stock returns are comoved with the location of headquarters. They argue that the geographic component is considered to convey considerable information in the stock price. Garcia and Norli (2012) indicate that local firms reach higher monthly returns compared to geographically dispersed firms. They argue that this is because local firms are associated with lower investor recognition, resulting in higher compensation to investors in order to meet their expectations, which is consistent with the investor recognition hypothesis proposed by Merton (1987). Addoum, Kumar and Law (2017) reveal that firms' geographic dispersion can be used as patterns to predict stock returns, which is because market participants cannot fully incorporate the dispersed information of earnings into stock prices. Bernile, Kumar and Sulaeman (2015) conclude that geographic factors at the firm level causes local-biased information asymmetry in stock returns. Therefore, firms' geographic diversification is associated with dispersed information, which affects investors and stock returns. In a similar vein, we argue that such information asymmetry would also affect managers' decision making in geographic dispersed firms.

As a background to diversification studies, Litov, Moreton and Zenger (2012) argue that mixed information from industry diversification increases difficulties for analysts in evaluating a firm. Duru and Reeb (2002) document that international diversification increases information complexity, and is therefore associated with less accurate analyst forecasts. In a similar vein, Platikanova and Mattei (2016) reveal that the economic interests of firms that are geographically dispersed across different states in the U.S. increase information asymmetry between insiders and outsiders. Operating information in geographically dispersed firms tends to be fragmentary, especially in historical financial performance records (Addoum, Kumar and Law, 2017), because managers may not be able to collect dispersed business information efficiently. After all, a firm's spatially distributed business interests are often associated with geographically dispersed firm-specific information. Moreover, previous literature also suggests that market participants prefer to make geographically proximate investments for reasons associated with information disparity (see, for example, Coval and Moskowitz (1999); Garmaise and Moskowitz (2003)). Indeed, distance affects the means of information acquisition(Petersen and Rajan, 2002), and therefore exacerbates the information asymmetry issue. Thus, geographic dispersion can compromise information quality when it requires transfer over a long distance. In the spirit of their work, we conjecture that firms with business interests geographically dispersed across different U.S. states experience greater information asymmetry problems within the organization.

The IPO market is characterized by high information asymmetry. For instance, newly listed firms are required by the U.S. Securities and Exchange Commission (SEC) to include up to three year's financial information in their prospectus. Thus, there is very limited knowledge about firm operations in their pre-IPO period. However, insiders have access to private information that is not publicly available to outsiders. In this scenario, managers have more incentives to seek private benefits and omit shareholder objectives when making decisions for the firm. For instance, managers could manipulate the financial report in order to deceive shareholders, which could result in severe damage to the firm. Consequently, a conflict of interests exists between the principal (e.g. shareholders) and the agent (e.g. firm managers), which will result in agency problems (Jensen and Meckling, 1976). Bertrand and Schoar (2003) document that managerial decisions affect firm performance and behavior. In terms of alleviating agency problems, Gounopoulos and Pham (2018) find that specialist CEOs who are more likely to pursue shareholder objectives significantly reduce mortality rates for newly listed firms. Thus, a manager's decision is a determinant of a firm's future. In our study, we argue that in the face of the high information asymmetry that stems from geographically distributed business interests, managers are likely to make decisions that are against shareholder interests, potentially impacting on corporate performance and leading to IPO firm failures.

A firm's geographic diversification is associated with high information complexity (Duru and Reeb (2002); Denis, Denis and Yost (2002)), which affects the quality and quantity of information exchange between management and investors (Jennings, Seo and Tanlu, 2013). Moreover, the expansion of business operations and the raised level of information asymmetry, in turn, increase internal and external monitoring costs (Gao, Ng and Wang, 2008). John, Knyazeva and Knyazeva (2011) argue that distance can cause an agency problem, because shareholders cannot observe managers' behaviors remotely. Thus, managers from geographically dispersed firms face a moral hazard problem when making managerial decisions because of monitoring challenges, which could lead to more severe agency conflicts.

Furthermore, firms with operations in multiple states face a variety of challenges, such as local market competition, local economic conditions, and diverse political and regulatory influences. Jared D Smith (2016) documents that local political corruption affects firms' financial policies. His study implies that managers may behave differently in making decisions depending on the operating environment in which the firm has business interests. Thus, decision-making in geographically dispersed firms is required to be more flexible. In this regard, Landier, Nair and Wulf (2009) document that managerial decisions in such firms could be made according to a manager's social standing, which is potentially against the principle of maximization of shareholder value. As a result, spatially distributed business interests enable managers to enjoy discretion in operations, including moving income between different areas of the U.S. (e.g. Dyreng, Lindsey and Thornock (2013)). Therefore, geographically dispersed firms feature more volatile operating environments, which will exacerbate moral hazard issues associated with management decisions (Clifford W Smith and Watts (1992); Himmelberg, Hubbard and Palia (1999)).

Geographic dispersion may also have an impact on the product differentiation. Because firms' geographically dispersed business interests may require more resources, managers are likely to divert their focus away from the main business activities, thereby negatively affecting the product scope (e.g., Meyer (2006)). Moreover, the reduced level of the product differentiation is likely to lower firms' competitiveness with industry rivals in the market (e.g., Dickson and Ginter (1987)). Afterall, the dispersed information at the firm level may affect managers' decisions that are related to expand the product lines.

During the process of going public, firms raise a large amount of capital to facilitate different purposes, such as financing further investments or accessing additional market sources. If a firm's business is highly geographically dispersed across different U.S. states at the time of going public, the firm is more likely to maintain ongoing investment and operational expansion after the offering. One source of firm expansion is through merger and acquisition (M&A) activities, because many firms take advantage of going public to expedite future M&As (e.g. Celikyurt Celikyurt, Sevilir and Shivdasani (2010)). Consequently, the information asymmetry problem between managers and shareholders could remain longer in the subsequent periods after the public offerings, which is likely to divert managerial incentives away from maximizing shareholder benefits and result in poor corporate performance. On the basis of these arguments, we should expect that *firms with geographically dispersed business interests at the time of going public are negatively associated with post-IPO survival.*

3.3 Data and methodology

3.3.1 IPO data

We collected the share information of common stocks in the U.S. between 1st January 1994 and 31st December 2012 from the *Security Data Corporation's (SDC) New Issue* database. To eliminate the negative impacts associated with specific offerings, we follow previous studies in excluding the following cases from our sample: 1) issues with an offer price below $5; 2) special vehicles, including closed-end funds, unit offerings, real investment trusts (REITs), American depositary receipts (ADRs), leveraged buyouts (LBOs), and financial institutions. We further obtain the firms' financial information from *Compustat* and stock price data from the *Center for Research in Security Prices (CRSP)*.

Following previous studies (e.g. Gounopoulos and Pham (2018)), we track each IPO firm from the date of listing to its delisting date or the end of 2017, whichever is earlier. To distinguish each firm's listing status, we obtain the delisting codes from CRSP and classify firms as *survived* if the code is 100 (i.e. it continued to trade at the end of 2017), and as *acquired* if the IPO firm has assigned to it a code between 200 and 299. Previous studies, such as Espenlaub et al. (2016), and Gounopoulos and Pham (2018), define failed firms as those that delisted from the market for negative reasons (e.g. liquidation, bankruptcy, insufficient capital, failure to meet financial regulation, or delinquent in filings), rather than delisting motives with less harmful impacts on investors (e.g. M&A). Therefore, the failed firms in our sample are those with a code equal to or greater than 300.

3.3.2 Measuring geographic dispersion

We measure the geographically dispersed business interests of newly listed firms using the content of 10-K forms (an annual report required by the U.S. SEC) retrieved from the Electronic Data Gathering, Analysis, and Retrieval (EDGAR) database. This approach has been widely examined and accepted by previous studies (e.g. Garcia and Norli (2012); Bernile, Kumar and Sulaeman (2015); Platikanova and Mattei (2016); Addoum, Kumar and Law (2017); Smajlbegovic (2018)). To capture the characteristics of geographic dispersion at the time of the offering event, for each firm we download from EDGAR the Form 10-K that was reported for the year preceding IPO. Following prior literature, we count the number of times that any state is mentioned in the following sections: Item 1: Business; Item 2: Properties; Item 6: Consolidated Financial Data; Item7: Management's Discussion and Analysis [9]. Bernile, Kumar and Sulaeman (2015) and Addoum, Kumar and Law (2017) confirm that these four sections outline a firm's geographically diversified operating activities, such as properties and equipment, store and office locations, and M&A activities, that are associated with stock and corporate performances. Moreover, this method of measuring firms' spatially distributed business interests can avoid the problem of firms not disclosing accounting numbers by state (Garcia and Norli, 2012). We merge our data with that of Garcia and Norli (2012)[10] to improve data availability and reliability. Ultimately, our sample of 2,432 IPOs with valid information comprises 507 survivors, 1,201 acquired firms, and 724 failed firms.

In our sample, the most frequently mentioned states in the 10-K forms are California (9.71%), Delaware (8.4%), and New York (5.99%), and the least frequently cited states are Vermont (0.34%), South Dakota (0.33%), and North Dakota (0.31%). Because many firms are incorporated in Delaware or Washington, these two states are likely to be outliers in our analysis. In unreported results, we show that our findings are robust when these two states are excluded.

Following Platikanova and Mattei (2016), we measure the level of a firm's geographic dispersion by computing a normalized Herfindahl–Hirschman index:

[9] In the case of missing 10-K reports, we follow Garcia and Norli (2012) in using alternative reports: forms 10k/A, 10-K405, 10-KSB, 10-KT, 10KSB, 10KSB40, 10KT405 and the amendments to these forms. We require all reports used to have been issued in the IPO year, which addresses the time constraint on a firm for filing the report.
[10] We thank Garcia and Norli for providing the data, which is available from their website.

$$SS_{i,(IPo\ year)} = \left(\frac{\#Alabama_{i,(IPO\ year)}}{\#Total\ sate\ citations_{i,(IPO\ year)}}\right)^2 + \cdots + \left(\frac{\#New\ York_{i,(IPO\ year)}}{\#Total\ sate\ citations_{i,(IPO\ year)}}\right)^2 + \cdots + \left(\frac{\#Wyoming_{i,(IPO\ year)}}{\#Total\ sate\ citations_{i,(IPO\ year)}}\right)^2 \tag{1}$$

$$Concentration_{i,(IPo\ year)} = \frac{SS_{i,t} - 1/50}{1 - 1/50} \tag{2}$$

where $SS_{i,(IPO\ year)}$ in Equation 1 is the aggregated value of the squared ratio of each state count divided by all state citations for firm *i* in the IPO year, and $Concentration_{i,(IPO\ year)}$ in Equation 2 is the normalized HHI of the degree of an IPO firm's geographic dispersion across different states.

The variable *Concentration* ranges from 0 to 1, where a value of 0 indicates that a firm has business interests equally distributed across the 50 U.S. states at the time of going public, and a value of 1 indicates that a firm entirely conducts its business activities in just one state. Thus, larger values of the variable *Concentration* suggest that an IPO firm has more geographically concentrated business interests, implying that the firm is less dispersed.

Following Platikanova and Mattei (2016), we construct two additional measures of geographic dispersion, which are related to industry competitors and local economic shocks. First, the variable of *GEOSIMILAR* is a cosine similarity for each observation in our sample, which uses relative state citations to calculate the pairwise similarity of the level of geographic dispersion between any two newly listed firms at the same 3-digit SIC level. The measure implies to what extent an IPO firm's business activities across U.S. states are similar to those of their competitors, which distinguishes differing distances between firms in the 10-K based geographically dispersed business interests and differentiate firms from other industry rivals.

Next, we consider the correlation between firm's spatially distributed business interests and local economic shocks. The local shocks derive from the variance of personal income per capital at the state level which are detrended from its economic series and measured over a 10-years period[11]. We weight the correlation between local shocks by the importance of each state where firms have business interests (e.g., relative state citations). The variable *GEOCORR* captures to what extent a firm's geographic dispersion is correlated with local economic shocks. The measure takes 1 if the newly listed firm has the dispersed business interest only in one state.

3.3.3 Methodology

Survival analysis has been widely applied to predict events such as bank and corporate failures, employee turnover (Somers, 1996), and venture capitalists' participation in firms and subsequent M&As after IPOs (Gill and Walz, 2016). Previous studies also use survival analysis to investigate the determinants of post-IPO firm failures (e.g. Jain and Kini (2000); Jain and Kini (2008); Espenlaub et al. (2016); Gounopoulos and Pham (2018)). Compared to conventional econometrical models (e.g. logistic or probit regressions) that only predict the occurrence of an event, survival analysis is capable of incorporating time horizon factors before the event occurs, and also taking censored observations into account. An observation is treated as censored if the event has not yet taken place during the study period. Thus, our sample is right-censored because many IPO firms continued to trade after the end of the tracking period (e.g. 31 December 2017). In addition, the time horizon window is different for each firm depending on the time that the IPO occurred. For example, we track a firm that went public in 2005 for ten years, but if it went public in 2010 we only track it for seven.

Our analysis of the relationship between geographic dispersion and a newly listed firm's survival involves two stages. We first use nonparametric approaches: by implementing a survival function, we are able to assess the newly listed firm's survival probability up to a specific time. The Kaplan–Meier survival function is presented as:

$$\hat{S}(t_j) = \prod_{j(t_j \leq t)} \left(\frac{n_j - d_j}{n_j} \right) \tag{3}$$

[11] Unlike Platikanova and Mattei (2016), we use the archival state-level economic time series from 1959 to 2017. Because our sample period spans 18 years, which is longer than their study. The data is from the Federal Reserve Bank of St. Loui, Archival Federal Reserve Economic Data (ALFRD).

where t_j indicates the time when an IPO firm's delisting occurs, n_j is the number of surviving IPOs before the time t_j, and d_j is the number of failed IPOs at time t_j. We use a log-rank test to examine whether the survival functions are significantly different between different groups of firms distinguished by their geographic-dispersion levels.

In the main analysis that follows, we implement parametric approaches that include the Cox proportional-hazards (CPH) model. The CPH procedure combines a hazard model and a maximum partial likelihood estimation process (David, 1972). The advantage of using the CPH model is that it does not need the hazard function to be pre-specified and can take any function form (Allison, 2010). We estimate the Cox proportional-hazards model as follows:

$$h(t) = h_0(t)\text{exp}\,[\beta_1 Geograhic\ dispersion + \beta_2 Firm\ age + \beta_3 Initial\ return + \beta_4 Proceeds + \beta_5 Underwriter + \beta_6 Venture\ capital + \beta_7 Auditor + \beta_8 Sale + \beta_9 Leverage + \beta_{10} Protitability + \beta_{11} Market - to - book + Year\ dummdies + Industry\ dummies] \quad (4)$$

where $h_0(t)$ is the hazard function; the dependent variable is the hazard ratio relating to firm failure risk. A positive (or negative) coefficient implies that the IPO firm is more (or less) likely to be delisted in the future; likewise, the corresponding survival time is shorter (or longer). For each of the control variables, the hazard ratio is calculated as an exponentiated coefficient, which indicates the probability of firm failure risk. For binary variables, the hazard ratio is served as the ratio of estimated hazard for those with value 1 to that of those with value 0. For continuous variables, the change of estimated hazard for a unit increase in the covariate is measured as 100× (hazard ratio–1) (Jain and Kini (2008); Allison (2010)). Moreover, adopting the CPH regression requires that the model is proportional hazards, which indicates that any two variables display the ratios of hazards that are proportional over time. In unreported results, we conduct relevant test and ensure that our CPH models used in the study meet the proportional hazards assumption.

The variable of interest is a firm's geographic dispersion related measure. We incorporate into the analysis control variables that are found to have an impact on IPO survival. First, we include variables *Proceeds*, *Sales*, and *Firm age*, because large firms (or firms with a longer operating history) reduce information asymmetry and have less valuation uncertainty, and therefore lower IPO failure risk (Hensler, Rutherford and Springer (1997); Demers and Joos (2007)). Moreover, some studies document that the participation of financial intermediaries in newly listed firms also improves post-IPO survival profile. Specifically, top-tier underwriters and auditors play a certification role in reducing firms' specific risks and the information disparity between offerings and investors during the process of going public, thereby lowering post-IPO failure risks (e.g. Schultz (1993); Carter, Dark and Singh (1998); Weber and Willenborg (2003); Corwin and Schultz (2005)). Moreover, venture capitalists (VCs) add value to the portfolios of firms by exercising intensive monitoring through their expertise in the industry and board positions, which improves corporate performance (e.g. Brav and Gompers (1997); Hellmann and Puri (2002); Krishnan et al. (2011)). Jain and Kini (2000) reveal a positive relationship between VC involvement and IPO survival. We, therefore, consider these information-reducing and value-adding intermediaries by incorporating the variables *Venture capital*, *Underwriter*, and *Auditor* in the analysis. Furthermore, IPO initial returns may be used as a signal of the quality of issuers (Welch, 1989). Thus, we follow Demers and Joos (2007) in controlling this effect by incorporating *Initial return* in the study. We also control for other financial characteristics of firms at the time of going public, including *Leverage*, *Profitability* and *Market-to-book* (e.g. growth opportunities) (see, for example, Gounopoulos and Pham, 2017 Gounopoulos and Pham (2018)). We report a correlation matrix of the variables used in our study in Appendix B and find no evidence of multicollinearity. Definitions of the variables are provided in Appendix A.

3.3.4. Data description

Table 1 displays IPO distributions of the sample. In Panel A, when tracking from offering date to the end of 2017, firms that failed, were acquired, or survived occupy 29.77%, 49.38%, and 20.85% of our sample, respectively. When tracking up to five years after going public, 19.28% of firms had failed, 24.96% were acquired, and 55.76% survived. Panels B and C report IPO distributions by year and industry, and firms' delisting status is tracked up to five years after offering. According to Panel B, the percentage of firms delisted was highest in 1994 and lowest in 2004 (2012 and 2005 for acquired firms), accounting respectively for 40% and 3.85% of firms (36.67% and 10.23% for acquired firms). More than half of the IPO firms survived their first five years of listing, except in years 1996, 1997, and 2008. In Panel C, we note that health services and chemical products industries account respectively for the highest (33.33%) and lowest (9.84%) percentages of firm failures. Entertainment services, wholesale and retail trade, and transportation and public utilities exhibit relatively high delisting rates, ranging from 25.49% to 29.03%. Moreover, in our sample, firms in the entertainment services industry are the most likely to be acquired (33.33%), and firms in the health services industry are the least likely to be acquired (19.05%). In the majority of industries, more than 50 percent of firms survived five years after going public.

In Table 2, we report Kaplan–Meier survival rates for subgroups of firms up to five years after going public, stratified by the firms' business concentration levels. In Panel A, we categorize firms into low- and high-concentration groups based on the median value of the HHI. The overall survival rates for highly concentrated firms are consistently greater than those of lightly concentrated firms through the first year of listing until the fifth year of listing. For example, the survival rate for highly concentrated firms is 80.54% in the fifth year, indicating a 5.07% excessive value compared to the figure of 75.47% for lightly concentrated firms. In Panel B, we stratify our sample according to concentration-level quartiles. We observe that, consistent with Panel A, survival rates increase in line with higher levels of business concentration. The reported *p*-values of a log-rank test are 0.003 for Panel A and 0.011 for Panel B, which reject the null hypothesis that the survival functions for the different levels of firm business concentration are equal. Overall, the evidence from nonparametric analysis provides initial support to our hypothesis that a firm's geographically dispersed business interests are negatively associated with post-IPO survival.

Table 3 provides descriptive statistics of variables associated with geographic dispersion, as well as firm and offering characteristics, grouped by low and high business concentration features. Panel A reports firms' geographical characteristics for our sample. In the issuing year, the average number of states in which firms show business interests is 6.169 (3.807 for regions). The average cosine similarity value for firms that share geographically dispersed business interests with industry competitors (*GEOSIMILAR*) is

0.29, and the average value for the correlation between a firm's dispersion and local economic shocks (*GEOCORR*) is 0.227. In particular, the dispersed business interests in highly concentrated firms are more deeply correlated with local economic shocks than lightly concentrated ones (0.366 vs. 0.088), and the difference is statistically significant at the 1% level. The average business concentration around the headquarters location is 0.501. Firms with more concentrated business interests exhibit greater focus on their HQ than firms with highly dispersed business interests (0.688 vs. 0.314). On average, 51.2% of issuers are located in a large community (e.g. higher local population at the county level).

Panel B reports offering and firm characteristics. Firms went public at an average age of 13.134 years and raise mean proceeds of $104.649 million. The mean initial returns for new issuers is 28.348%. In terms of financial intermediaries interacting with IPO firms, 48.8% were supported by venture capitalists, 37.7% hired top-tier investment banks, and over half of the issuers (67.9%) were audited by 'Big Four' auditors. Moreover, the mean sales for firms around IPO is $280.624 million, with average leverage and market-to-book ratios of 0.34 and 6.095, respectively. IPO firms report a mean profitability ratio of -0.048, which is consistent with the argument that firms prefer to go public before generating positive profits from 1990s (Jain et al., 2008). This finding is also close to the figure recorded by previous studies (e.g. Gounopoulos and Pham, 2017). Finally, on average, firms operate in 1.704 industries and 0.808 foreign countries (e.g., outside the U.S.) at the time of going public.

A majority of firm and offering characteristics exhibit significant differences between low- and high-concentration firms, exceptions being market-to-book ratio and international segments (Intl.SEG). IPO firms with more concentrated business interests are younger than firms with less concentrated ones (11.658 years vs. 14.617 years). In addition, less geographically dispersed firms experience lower initial returns than firms with highly dispersed business interests (25.035% vs. 31.677%). This finding potentially supports our informational argument that geographic dispersion gives rise to information asymmetry, because previous studies present the general notion that asymmetric information between insiders and outsiders results in higher initial returns (e.g. Levis (1990); Loughran and McDonald (2013); Bajo and Raimondo (2017)). Less concentrated firms raise nearly double the capital during the process of going public than highly concentrated firms ($136.259 million vs. $73.194 million). In addition, the average sales for firms with lightly concentrated business interests are 50 percent above those of firms with highly concentrated business interests ($380.112 million vs. $181.626 million). This evidence implies that geographically dispersed firms are usually larger in size, which supports the argument of Garcia and Norli (2012).

Furthermore, IPO firms in the two groups show evidence of different financial policies. Specifically, the average leverage ratio for lightly concentrated firms is greater than highly concentrated ones (0.374 vs. 0.307), which is consistent with our argument that managers may make different decisions depending on the operating environment (e.g. according to the level of a firm's geographic dispersion). The mean market-to-book ratio is 6.427 for firms with lightly concentrated business interests, and 5.764 for firms with highly concentrated interests. Moreover, VCs are more likely to invest in highly concentrated firms than lightly concentrated ones (54.2% vs. 43.4%); one possible reason is that VCs can better monitor and screen a portfolio if the firm is less geographically dispersed, resulting in proximity investment preference (see, for example, Lerner (1995)). Firms with lower business concentrations show a higher preference for hiring reputable investment banks and auditors (41% and 69.2%, respectively) than firms with high business concentrations (34.5% and 66.5%, respectively). On average, lightly concentrated firms are more diversified than highly concentrated ones in terms of the industry and international segments in which they operate. Lastly, regarding the IPO failure, significantly greater portion of firms with lightly concentrated business are delisted due to negative reasons within the first five years after the offering than that of firms with highly concentrated business (21.4% and 17.2%, respectively).

3.4 Empirical analysis of firms' geographical dispersion on IPO survival

3.4.1 Survival analysis of geographically dispersed IPO firms (CPH model)

We now estimate variants of Equation 4 to investigate the impact of geographic dispersion on IPO firms' survivorship, after controlling for various firm and offering characteristics that are related to the probability of IPO failure risk. In order to control for unobserved effects on the delisting of IPO firms (e.g. financial crisis years), we incorporate year and industry effects in all regression analyses in which coefficients are suppressed. The results of the estimations from the CPH model are tabulated in Table 4 in the form of four specifications.

In specification (1), we first use our state-citation-based HHI measure (*Concentration*), which indicates the degree of geographical dispersion in an IPO firm. The coefficient for the variable of interest is -0.563, at a significance level of 1 percent, implying a strong negative relationship between the level of an IPO firm's business concentration and its post-offering failure risk. In other words, more geographically dispersed business interests (i.e. distributed across more states) in a newly listed firm significantly increase the hazard of being delisted and decrease survival times in post-offering periods. The hazard ratio of 0.569 implies that a one-unit increase in *Concentration* is associated with a 43.1% reduction in the risk of failure in periods subsequent to the offering. In specification (2), the coefficient for *High-concentration firms* is -0.279 and is statistically significant at the 1% level, suggesting that highly geographically dispersed IPO firms are more likely to experience failure compared to their counterparts with less dispersed business interests. The hazard ratio of *High-concentration firms* suggests that lower levels of geographic dispersion in firms make it 0.756 times less likely that such firms will fail relative to firms with higher levels of geographic dispersion.

In specification (3), we present the analysis using the degree of geographic similarity for a newly listed firm within the same industry. Higher values of variable *GEOSIMILAR* imply that an IPO firm's business interests across U.S. states are similar to those of their industry competitors. Platikanova and Mattei (2016) document that analysts' precision is increased in a given state if more firms in the same industry share geographically similar economic activities, because the cost of collecting information is reduced. In a similar vein, we expect that such lower-cost information collection processes may also be applied to alleviate potential agency conflicts between managers and shareholders. One explanation could be that, for instance, shareholders may more easily identify the advantages and disadvantages of operating in a given state by comparing information from competitors, and can thereby more readily direct managers to take actions to improve corporate performance.[12]

Next, in specification (4), we consider the effect on corporate failure of firm's geographically dispersed business interests related local economic shocks. Higher values of *GEOCORR* indicate that the IPO firm either operates in one state only, or that its operations in multiple states are closely correlated with local economic disturbance(s). The integrity of operations in different states that are closely correlated with local shocks enables firms to have better access to local resources, including customers, suppliers, and local regulators, among many others. In such circumstances, we expect that insiders can collect and analyse information more efficiently from closely correlated states in which the firm has business interests. Therefore, we conjecture that geographically dispersed IPO firms that are closely tied in to local shocks are less likely to experience failure.

In specification (3) of Table 4, we find a negative coefficient (-0.751) for *GEOSIMILAR*, at a highly significant level of 1 percent. This result is consistent with the conjecture that firms sharing geographically dispersed business interests with industry counterparts experience lower failure risk, because there is more comparable information in the marketplace. In specification (4), we observe that the variable *GEOCORR* displays a negative sign (-0.548) and is statistically significant at the 1% level. This finding provides evidence that IPO firms are less likely to fail if their geographically dispersed business interests are closely associated with local economic shocks. Given the hazard ratios for *GEOSIMILAR* and *GEOCORR* of 0.472 and 0.578, respectively, a one-unit increase in *GEOSIMILAR* indicates that IPO failure risk decreases by 52.8% (42.2% in the case of a similar rise in *GEOCORR*).

A majority of our control variables display the expected signs and significance at conventional levels. Specifically, we find that offering factors such as longer operating history, the raising of more proceeds, and larger firm size (e.g., higher sales) significantly extend survival times for IPO firms, which is consistent with findings from Hensler, Rutherford and Springer (1997) and Demers and Joos (2007). Moreover, the participation of financial intermediaries, including venture capitalists and reputable underwriters, also

[12] Our argument is similar to that of De Franco et al. (2011), which finds that comparable accounting information among different firms lowers information asymmetry and improves information quality and quantity between insiders and outsiders (e.g., analysts).

contributes to better survival profiles (e.g. Jain and Kini (2000)). Firms with high leverage are associated with shorter survival times in the periods after IPO, as per Gounopoulos and Pham (2018). Finally, in line with Jain and Kini (2008), firms survive longer if they have higher profitability and better market-to-book ratio at the time of going public.

Overall, the results support the earlier findings from the use of nonparametric approaches, shown in Table 2. That is, a higher level of geographic dispersion in an IPO firm increases the probability of failure risk and reduces survival times in periods subsequent to the offering, which is aligned with our primary hypothesis.

3.4.2 Geographic dispersion and IPO survival: Information and social concern

In this section, we replicate the research design of Landier, Nair and Wulf (2009) to address how the information environment and managerial social concerns affect the survival of geographically dispersed IPO firms.

3.4.2.1 Information environment

Petersen (2004) suggests that information transmission performs differently depending on the information environment. Specifically, he argues that some information is quantifiable (e.g. accounting figures) and is easy to store and transfer through advanced means (e.g. technologies such as email), which is characterized as *hard* information. On the other hand, the collection and processing of *soft* information (e.g. rumors) mainly relies on personal interaction, and is difficult to completely summarize and verify over distance[13]. Such an information mechanism explains the increasing distances between lenders and borrowers, as bankers more readily lend to remotely located firms when relevant information can be rendered harder or more impersonal[14]. Therefore, a soft information environment features higher information asymmetry than a hard one.

[13] An example is that the variation of stock price could depend on the informal market observations that constitute soft information, rather than the hard information conveyed by official means (e.g. financial reports, earnings calls) (see, for example, Loughran and Schultz (2005)).

[14] Berger et al. (2005) find that large banks prefer to lend to more distant firms because lenders take advantage of technologies to communicate with customers in a hard information environment. Similar evidence can also be found in Petersen and Rajan (2002).

Because distance affects the means of information acquisition, we should expect that geographically dispersed firms will experience higher information asymmetry when operating in a softer information environment. Managers may experience greater difficulties in obtaining information from spatially distributed business interests in support of precise decisions, and shareholders may also find that it is not easy to observe management behaviors remotely in such an information setting. Conversely, firms with greater business concentrations enjoy better within-organization information flow and more intensive monitoring from shareholders, which should be less affected by the type of information environment in operation. After all, less dispersed business interests provide firms with better communication channels. Moreover, Landier, Nair and Wulf (2009) suggest that information quality should remain unchanged when that information is quantifiable, regardless of distance factors. On the basis of the discussion above, we expect the low survivability among geographically dispersed firms to be more prominent in a soft information setting.

To examine this conjecture, we collect data on the distance between firms and financial institutions from the National Survey of Small Business Finance before calculating the average change in this distance between survey years at the two-digit industry level[15]. We define firms as operating in a soft information environment if the mean distance change is below the median value, and in a hard information environment otherwise. The results are tabulated in Table 5.

In specification (1), we introduce an interaction term between the level of geographic concentration (*Concentration*) and our measure of the information environment in a firm's industry (*Soft information*) to our CPH model of IPO survival. We find a negative coefficient (significant at the 5% level) for *Concentration*Soft information*, which suggests that the level of a firm's geographic dispersion is positively associated with failure risk if the firm operates in a soft information environment. This result supports empirical evidence from previous studies that documents a relationship between information asymmetry issues and different information settings. For instance, Platikanova and Mattei (2016) show that earnings forecasts for geographically dispersed

[15] The survey report is only available for the years 1987, 1993, 1998, and 2003. Our approach to measures of soft and hard information environments is similar to that of Landier, Nair and Wulf (2009) and Platikanova and Mattei (2016).

firms are less accurate in an environment where information cannot be made impersonal at low cost (i.e. soft information), which points to high information disparity between insiders and outsiders. Thus, we reveal the importance of the information environment in determining the survival of geographically dispersed newly listed firms, which partially supports our hypothesis.

3.4.2.2 Managerial social concern

Landier, Nair and Wulf (2009) suggest that managerial decisions could be made on the basis of personal social standing. They find that managers are more likely to protect employees in small communities, for avoidance of embarrassment and/or other selfish motivations. Such social concerns are likely to divert managers away from managerial incentives and increase moral hazard issues. For instance, when a firm seeks a supplier, managers in small communities may prefer to cooperate with acquaintances (e.g. friends, family members) rather than selecting the most appropriate partner (e.g. through quality matching). Because the information collection process in a soft information environment mainly relies on personal interactions, we explore how social concerns affect survival profiles of geographically dispersed IPO firms within such settings.

Our social concern measure derives from the finding of Landier, Nair and Wulf (2009) that community size can influence a manager's decision-making. To capture this social effect on managerial decisions in relation to the survivability of geographically dispersed IPO firms, we first collect the county names in which firms' headquarters are located according to the addresses and zip codes obtained from Compustat. Next, we gather population data for each such county from the U.S. Census Bureau. We define a firm as being in a large community if the local population is above the sample median (701,080), and small if it is below. The community size is expected to capture the potential agency conflicts between managers and shareholders.

We divide our sample on the basis of small and large community sizes, as shown in Table 5. We observe that the coefficient for the interaction term *Concentration*Soft information* appears negative and significant at the 5% level in specification (2), which suggests that geographic dispersion increases IPO firms' failure risk in a soft information environment only when a firm's headquarters is located in a county with a small population. We do not find such evidence in which firms operate in a hard information environment, in specification (3). Our results are less likely to be attributable to the costs of information collection in less or more populated counties, otherwise we should also find similar evidence in large communities.

Overall, the results offer important implications in relation to geographic dispersion and firm survival. First, we show that geographically dispersed IPO firms are more likely to fail in a soft information environment, which is consistent with our information asymmetry argument. Second, the empirical evidence from small communities is consistent with the view of Landier, Nair and Wulf (2009) that managerial social concerns affect management decision-making, potentially in opposition to the objective of maximizing shareholder value. Thus, our hypothesis that geographically dispersed firms experience greater internal information asymmetry that negatively affects managerial decisions, leading to a higher probability of failure in post-IPO periods, is upheld.

3.4.3 Post-IPO performance

Because we conjectured that managers in geographically dispersed firms are more likely to make decisions against shareholder interests and give rise to post-IPO failure, it is natural to examine whether such behavior can be related to a firm's operating performance in post-IPO periods.

Our measure used to proxy the post-IPO operating performance is the operating return on assets, which is the ratio of operating income before depreciation to total assets (e.g., Jain and Kini (1994)). This variable captures to what extent a firm is efficient in converting the capital it invests into net income; a high value indicates that a firm generates more profit with less investment. The method we adopted to identify the matching firm is similar to that of Purnanandam and Swaminathan (2004) and Shantanu Banerjee, Güçbilmez and Pawlina (2016). Specifically, we match each IPO firm in our sample with an industry peer (at the 3-digit SIC code) based on the comparable sales and EBITDA profit margins, where the EBITDA profit margin is defined as the ratio of EBITDA to sales. For the matching firm, we apply the following restrictions: 1) the firm has been trading at least three years at the time of issuer's initial public offering; 2) a stock price is no less than $5 in the same fiscal year that the IPO firm starts trading in the market. 3) firms are ordinary shares, and exclude closed-end funds, unit offerings, REITs, ADRs, LBOs, and financial institutions. During the matching process, we use the next available matching firm if any firm has a missing accounting value in a particular fiscal year, but the IPO firm's accounting information is available in the same year. We calculate the growth of the IPO firm's post-operating performance as the change of operating return on assets between the offering year and year *y* less the corresponding change for the matching firm. Because of the matching restrictions, accounting data availability from *Compustat*, and the IPO's listing status, our sample drops and varies between different post-offering years. We include all control variables from the baseline regression analysis as well as year and industry dummies whose coefficients are suppressed for brevity. The results are tabulated in Table 6.

First, in Panel A, we use univariate analysis to compare the post-IPO performance growth for each of our subsamples: low and high business concentration firms. We find that IPO firms with more concentrated business consistently outperform counterparts with less concentrated business in three years subsequent to the offering, and the differences are highly significant at the 1% level. Further, over the first year of listing, both subsamples of firms are associated with the operating performance growth that is on average higher than the performance of matched firms. However, staring in the second year, we observe that firms with less concentrated business experience declined operating performance growth compared to IPO year; while firms with more concentrated business enjoy continuously positive growth. The OLS regressions confirm those results in Panel B, where we regress the growth of operating return on assets on the firm's geographic dispersion measures. Specifically, the coefficients on *Concentration* and *High CONC* are positive and statistically significant at the 1% level, suggesting that the growth of an IPO firm's ability to generate profits based on their investments increases with decreasing levels of geographic dispersion.

Overall, the evidence supports our hypothesis that a firm's geographically dispersed business interests degrade firm performance, and promote post-IPO failure.

3.4.4 Additional test: Firm headquarters size

A firm's headquarters takes responsibility for allocating resources to geographically dispersed business units, including labor, R&D funds, and manufacturing equipment. Divisions, therefore, perform activities and tasks according to the orders received from headquarters. Further, a well-defined control system adopted by an HQ to monitor and screen division activities reduces agency costs (Eisenhardt, 1985). Therefore, the corporate headquarters is important to financial and managerial performance because it has decision-making, coordinating and value-adding functions within the organization (e.g. Chandler (1991); Collis, Young and Goold (2007)). Because the magnitude of the headquarters matters to its fundamental roles (Hill, Hitt and Hoskisson, 1992), we specifically evaluate the importance of headquarters size to survival profiles of geographically dispersed IPO firms.

We take advantage of our state-count data to construct a variable *HQ%* by using the citation share of the headquarters state relative to all other relevant states as a proxy for the magnitude of the HQ. Larger values of *HQ%* indicate higher levels of business concentration in the headquarters state. This variable provides us with a clear picture of the extent of an IPO firm's operational concentration at the headquarters location, regardless of the level of geographical dispersion. The results are tabulated in Table 7.

We find that the coefficient for the variable of interest *HQ%* is -0.402 and is significant at the 5% level, indicating that IPO firms with a higher percentage of business concentration around the headquarters location are associated with lower probabilities of failure. The hazard ratio of 0.669 indicates that a one-unit increase in *HQ%* is associated with a 33.1% reduction in post-offering failure risks. This finding is consistent with the notion that the size of corporate headquarters plays a dominant role in firm performance, which supports previous studies (e.g., Hill, Hitt and Hoskisson (1992)).

3.5 Robustness tests

3.5.1 Control for high-tech firms

High-tech firms are usually young and associated with more growth opportunities. Thus, they feature higher risks than others and are also more likely to engender greater agency conflicts between managers and shareholders. Moreover, such firms tend to have more intangible assets (e.g. patents, trademarks), which may be less affected by geographical dispersal of business interests. Therefore, we investigate whether the impact of a firm's geographic dispersion on IPO survival is a result of differing industries (e.g. high-tech vs. non-high-tech). In specification (1) of Table 8, we observe that the coefficient for *Concentration* is negative and significant at the 5% level, which is consistent with the evidence from the baseline analysis that geographic dispersion is negatively associated with IPO survival. The coefficient for the interaction term *Concentration*High-tech* is not statistically significant, suggesting that the impact of a firm's geographic dispersion on IPO survival is not dependent on whether or not the firm operates in a high-tech industry. In specifications (2) and (3), we conduct an analysis of the high-tech and non-high-tech industries subgroups by dividing our sample on this basis. As expected, the variable *Concentration* consistently displays negative and significant signs, confirming that geographic dispersion increases the level of IPO failure risk. A one-unit increase in *Concentration* decreases IPO failure risk by 50.3% for high-tech firms, and by 39% for non-high-tech firms.

3.5.2 Endogeneity control

In this section, we first question whether the impact of an IPO firm's geographic dispersion is driven by other corporate diversification factors rather than by within-country geographic dispersion. International diversification could expose firms to additional risks, such as fluctuations in exchange rates, localized policy variations, and foreign country regulations (Duru and Reeb, 2002). Moreover, Denis, Denis and Yost (2002) reveal that firms with foreign operations are associated with value reduction. Furthermore, industrial diversification is also associated with information asymmetry problems (e.g. Litov, Moreton and Zenger (2012)) and corporate performance (e.g. Jain, Jayaraman and Kini (2008); Lin and Su (2008)). Gao, Ng and Wang (2008) document that industrially diversified firms also exhibit a greater tendency to expand their business to other geographical areas. Further, both international and industrial diversifications may increase management's power and reputation through higher compensation and reduced personal risk, which also represents a potential conflict of interest with shareholders (see, for example, Denis, Denis and Yost (2002)). Therefore, we collect the number of international geographic and industry segments for the sample firms from *Compustat Segments* data and include variables *Intl.SEG and IndustrySEG* in the analysis. In Table 9, the sign of the coefficient for *Concentration* is consistent with previous findings and statistically significant at the 5% level. The evidence suggests that geographic dispersion positively affects firm failure risk in post-IPO periods, and is not attributable to systematic risks and additional issues stemming from other corporate diversifications.

Second, the *t*-tests shown earlier (e.g., in Table 3) indicate that most of our control variables are significantly different between high- and low-concentration firms. The differences in firm and IPO characteristics in the two groups of firms could be caused directly or indirectly by firm's business expansion, or by unobserved heterogeneity between IPO issuers. Thus, we use propensity score matching (PSM) to control for such observable differences. Using a propensity score matching analysis, we can statistically compare the outcome (e.g. post-IPO failure) of a treated observation (IPO firm) with an effect (high business concentration across U.S. states) to the same untreated observation on the basis of a number of covariates. Specifically, we incorporate rich sets of covariates for various offering and firm characteristics in the probit regression including *Firm age*, *Initial return*, *Proceeds*, *Venture capital*, *Underwriter*, *Auditor*, *Sales*, *Leverage*, *Profitability*, *Market-to-book*, *Intl.SEG*, *IndustrySEG*, *year* and *industry dummies.* We define our treatment observations as IPOs from highly concentrated firms to evaluate the effect of geographic dispersion on the occurrence of IPO failure. As shown in Table 10, the average treatment effect on the treated (ATET) is -0.074 with a significance level of 5%, suggesting more geographically concentrated IPO firms experience lower failure risks than their less concentrated counterparts. These findings are consistent with the results of the previous analysis.

3.5.3 Alternative measures of a firm's geographic dispersion

We consider alternative measures of geographic dispersion in this section. We first construct a variable *NState* by simply counting the number of different states in which a firm has business interests at the time of going public. Following Gao, Ng and Wang (2008), we then categorize in how many U.S. geographical regions an IPO firm has business activities. The variable *Region* is a count indicator ranging from one to nine in our sample. Further, because Garcia and Norli (2012) report that localized firms outperform dispersed ones in terms of stock returns, we follow their study and define the variable *Local*, which takes a value of 1 if the IPO firm has geographically dispersed business interests in one or two states, and is otherwise 0. The results from specifications (1) to (3) shown in Table 11 continue to support our hypothesis that geographic dispersion negatively relates to IPO survival.

Furthermore, geographically dispersed firms with operations in different states can exhibit distinct financial performance as a result of local economic conditions (e.g. Platikanova and Mattei, 2016). We use the gross domestic product (GDP) at the state level to construct a GDP-weighted HHI for firms' geographical dispersion. The variable *Concentration (GDP)* is expected to capture the effect of economic factors in the local state on the post-IPO performance of dispersed firms. In specification (4) of Table 11, we find a negative coefficient that is significant at the 5% level, suggesting that firms with more concentrated business interests are less likely to fail in post-IPO periods.

Firms are required to report major subsidiaries in Exhibit 21 of Form 10-K. Following Dyreng, Lindsey and Thornock (2013), we hand-collect the number of an IPO firm's subsidiaries from the corresponding reports used in our study. We then merge our data with their database provided by Dyreng, Lindsey and Thornock (2013) to increase the sample size[16]. We further require that each such firm has at least one subsidiary in the year of going public (e.g. Addoum, Kumar and Law (2017)), which eventually generates 1087 valid observations[17]. We take advantage of the state information about firm subsidiaries in Exhibit 21 to compute an HHI and use this as an alternative measure of geographic dispersion. In specification (5) of Table 11, we find a negative relationship between the level of a firm's subsidiary geographical concentration and IPO failure risk, the coefficient being -0.351 and significant at the 10% level.

Overall, we show that the results from our preceding analysis are robust to alternative measures of geographic dispersion.

---

[16] We thank Dyreng for providing the data, which is available from his website.

[17] This is consistent with the finding from Platikanova and Mattei (2016) that geographically dispersed firms are more likely to provide incomplete filings.

3.5.4 Other sensitivity checks

Welbourne and Andrews (1996) report that firms suffer from stock price declines around acquisitions and the acquired firms experience financial distress. In our main analysis, we classify failed firms as those that are delisted for adverse reasons (e.g. bankruptcy). In the spirit of Welbourne and Andrews, we redefine failed firms by also including those that are delisted because of M&As (i.e. delisting codes between 200 and 299). Moreover, we also follow previous studies (e.g. Jain, Jayaraman and Kini (2008)) and exclude acquired firms from the sample. We rerun our tests with these two restrictions on the definition of failed firms and find similar results to those in Table 4.

We also consider alternative analysis approaches. We first use an Accelerated Failure Time (AFT) model. Unlike the CPH model, the exponential of the coefficient for each independent variable in the AFT approach is the time ratio, known as an "acceleration factor" (Espenlaub et al., 2016). A time ratio greater than 1 indicates that the variable factor increases the survival time (less than 1 that it decreases it). Further, using the AFT approach requires a specific distribution for the model. The Akaike Information Criterion (AIC) test is used to determine the appropriate distribution for non-nested models, such as the log-logistic and lognormal distributions (e.g. Espenlaub et al. (2016)). Thus, we select the lognormal distribution because the AIC test shows it to have the lowest value. Moreover, we use the logit model to explore the likelihood of the occurrence of IPO failure. Finally, we only consider IPO firm's delisting caused by any negative reasons for up to five years after the offering. The results are consistent with our main findings that the level of geographic dispersion is negatively related to the survival profile of newly listed firms. The results of these alternative analyses are tabulated in Appendixes C, D, and E. Finally, we use CPH, AFT, and logit models to replicate our baseline regression by considering state fix effect. The results displayed in Appendix F confirm our main findings that are not affected by the state-specific shocks.

3.6 Conclusion

In this study, we examine the impact of geographic dispersion on an IPO firm's survivability. We argue that managers from geographically dispersed firms suffer from receiving information in which quality is compromised, and are therefore more likely to make decisions that are against shareholder objectives and cause agency conflicts. Ultimately, such decisions will be detrimental to corporate performance.

We use a unique text-based dataset from the Form 10-Ks released in the issuing year to measure an IPO firm's geographic dispersion. Based on the state citations, we construct a normalized HHI to serve as an indicator of the firm's geographically dispersed business interests. Through application of survival analysis, we document that geographic dispersion significantly escalates firm failure risk and shortens survival time in post-offering periods. Further, we find that geographically similar firms and firms with dispersed business interests that are closely associated with local economic shocks are less likely to fail.

We also explore the mechanisms that might affect the survival profile of geographically dispersed IPO firms. First, consistent with our conjecture that geographic dispersion causes information asymmetry, our empirical evidence reveals that dispersed IPO firms are more likely to fail when information is difficult to transfer and verify remotely (e.g. soft information). Second, we find that geographically diversified firms in small communities where social concerns may drive managerial decision-making are negatively associated with survivability in post-offering periods. The evidence suggests that information asymmetry and manager's decision-making are important factors in the survival profiles of geographically dispersed IPO firms. Finally, we document a negative relationship between firms with spatially distributed business interests and operating performance in post-IPO periods, which implies that geographic dispersion degrades corporate performance and may help to explain newly listed firm failure rates.

Our study contributes to the literature that investigates the association between geography and firm performance. In particular, it contributes to IPO studies by revealing that a firm's geographically dispersed business interests across different U.S. states serve as a significant determinant of a newly listed firm's post-IPO survival. Importantly, this study provides new insights to corporate performance which suggests firms should stay concentrated when running businesses in order to survive longer.

Table 1 IPO distribution

The table displays the distribution of IPO listing status for our sample. The sample includes newly listed firms in the US stock market from 1994 to 2012. Delisting status is tracked for five years after IPO by year (Panel B) and industry (Panel C). Survived firms are defined as those continuing to trade at the end of our tracking period (CRSP delisting code is 100); acquired firms are those that are delisted for reasons such as M&A (CRSP delisting codes between 200 and 299); failed firms are those that are delisted for negative reasons, such as bankruptcy and liquidation (CRSP delisting codes equal to or above 300).

Panel A: Distribution of IPOs from 1994 to 2012

	From IPO date to December 2017		From IPO date to five years after the offering	
	Obs.	%	Obs.	%
Failed	724	29.77	469	19.28
Acquired	1201	49.38	607	24.96
Survived	507	20.85	1356	55.76
Total	*2432*		*2432*	

Panel B: Distribution by IPO year

		Failed		Acquired		Survived	
Year	Obs.	Obs.	%	Obs.	%	Obs.	%
1994	10	4	40.00	0	0.00	6	60.00
1995	194	38	19.59	47	24.23	109	56.19
1996	493	113	22.92	139	28.19	241	48.88
1997	309	76	24.60	92	29.77	141	45.63
1998	177	52	29.38	35	19.77	90	50.85
1999	323	80	24.77	89	27.55	154	47.68
2000	243	46	18.93	52	21.40	145	59.67
2001	47	7	14.89	7	14.89	33	70.21
2002	38	4	10.53	11	28.95	23	60.53
2003	36	4	11.11	11	30.56	21	58.33
2004	104	4	3.85	30	28.85	70	67.31
2005	88	10	11.36	9	10.23	69	78.41
2006	88	7	7.95	21	23.86	60	68.18
2007	96	8	8.33	24	25.00	64	66.67
2008	3	1	33.33	1	33.33	1	33.33
2009	23	1	4.35	5	21.74	17	73.91
2010	55	6	10.91	7	12.73	42	76.36
2011	45	4	8.89	5	11.11	36	80.00
2012	60	4	6.67	22	36.67	34	56.67
Total	*2432*	*469*		*607*		*1356*	

Panel C: Distribution by industry

Industry	Obs.	Failed		Acquired		Survived	
		Obs.	%	Obs.	%	Obs.	%
Oil and gas (13)	53	8	15.09	11	20.75	34	64.15
Food products (20)	21	4	19.05	5	23.81	12	57.14
Chemical products (28)	254	25	9.84	50	19.69	179	70.47
Manufacturing (30–34)	49	10	20.41	14	28.57	25	51.02
Computer equipment & services (35, 73)	880	167	18.98	256	29.09	457	51.93
Electronic equipment (36)	205	27	13.17	47	22.93	131	63.90
Scientific instruments (38)	192	21	10.94	57	29.69	114	59.38
Transportation & public utilities (41, 42, 44–49)	186	54	29.03	41	22.04	91	48.92
Wholesale & retail trade (50–59)	219	61	27.85	43	19.63	115	52.51
Entertainment services (70, 78, 79)	51	13	25.49	17	33.33	21	41.18
Health services (80)	63	21	33.33	12	19.05	30	47.62
All others (01, 12, 15, 17, 22–27, 29, 37, 39, 72, 75, 82, 87, 96)	259	58	22.39	54	20.85	147	56.76
Total		*469*		*607*		*1356*	

Table 2 Kaplan–Meier survival rates stratified by IPO firm business concentration levels

The table displays the results of survival analysis for IPO firms from 1994 to 2012 for five years after listing using a Kaplan–Meier nonparametric approach. Panel A divides the sample into low and high business concentration groups: firms are assigned to the high-concentration group if the HHI-based geographic-dispersion measure is above the median value; and the low-concentration group otherwise. Panel B divides the sample into quartiles according to business concentration levels (25%, 50%, 75%, and 100%). We track firm's status up to five years after listing. Surviving firms are defined as those continuing to trade at the end of tracking period (CRSP delisting code 100); acquired firms are those delisted for reasons such as M&A (CRSP delisting codes between 200 and 299); failed firms are those delisted for negative reasons, such as bankruptcy and liquidation (CRSP delisting codes equal to or above 300). A log-rank test is used to assess the statistical significance of differences between survival functions across concentration levels.

Panel A: Kaplan–Meier survival rates by median of IPO firm business concentration (%)

	Cumulative Survival Rates					
	N	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
Low-concentration IPO firms	1213	99.75	94.76	87.58	80.42	75.47
High-concentration IPO firms	1219	99.75	95.79	90.78	85.41	80.54
Log-rank test for equality of survival functions						
Chi-squared	8.62					
P-value	0.003					

Panel B: Kaplan–Meier survival rates by quartile of IPO firm business concentration level (%)

		Cumulative Survival Rates				
Quartile		1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
1		99.51	95.88	89.77	82.22	77.15
2		100.00	93.65	85.38	78.67	73.89
3		99.67	95.90	90.76	85.70	81.36
4		99.83	95.66	90.75	85.05	79.63
Log-rank test for equality of survival functions						
Chi-squared	11.12					
P-value	0.011					

Table 3 Descriptive statistics

The table displays the descriptive statistics for the sample. The sample includes newly listed firms in the US stock market from 1994 to 2012. Panel A reports firm's geographical characteristics, and Panel B reports firm and IPO characteristics. A *t*-test is conducted to compare differences in means between two subsamples of IPO firms with low and high levels of geographically dispersed business interests. All variables are defined in Appendix A.

	Full sample						Low-concentration IPO firms		High-concentration IPO firms		Diff. in means (*p*-value)
	Obs.	Mean	p25	p50	p75	SD	Obs.	Mean	Obs.	Mean	
Panel A: Geographical characteristics											
NState	2432	6.169	3	4	8	5.834	1213	8.969	1219	3.382	0.000
Region	2432	3.807	2	3	5	2.019	1213	4.981	1219	2.638	0.000
GEOSIMILAR	2432	0.290	0.117	0.227	0.397	0.245	1213	0.282	1219	0.298	0.057
GEOCORR	2432	0.227	0.061	0.148	0.296	0.253	1213	0.088	1219	0.366	0.000
HQ%	2432	0.501	0.256	0.500	0.733	0.291	1213	0.314	1219	0.688	0.000
Community	2432	0.512	0	1	1	0.500	1213	0.486	1219	0.538	0.005
Panel B: Firm and IPO characteristics											
Firm age	2432	13.134	4	7	13.5	18.970	1213	14.617	1219	11.658	0.000
Initial return	2432	28.348	0	10.71	31.4	71.300	1213	31.677	1219	25.035	0.011
Proceeds	2432	104.649	27.5	49.2	89.65	415.387	1213	136.259	1219	73.194	0.000
Venture capital	2432	0.488	0	0	1	0.500	1213	0.434	1219	0.542	0.000
Underwriter	2432	0.377	0	0	1	0.485	1213	0.410	1219	0.345	0.001
Auditor	2432	0.679	0	1	1	0.467	1213	0.692	1219	0.665	0.076
Sales	2432	280.624	12.034	42.787	136.165	1451.883	1213	380.112	1219	181.626	0.000
Leverage	2432	0.340	0.142	0.263	0.481	0.319	1213	0.374	1219	0.307	0.000
Profitability	2432	-0.048	-0.181	0.039	0.134	0.328	1213	-0.025	1219	-0.070	0.000
Market-to-book	2432	6.095	2.308	3.656	6.295	23.878	1213	6.427	1219	5.764	0.247
IndustrySEG	2405	1.704	1	2	2	0.803	1192	1.776	1213	1.632	0.000
Intl.SEG	2057	0.808	0	0	1	1.582	1015	0.833	1042	0.784	0.244
IPO failure	2432	0.193	0	0	0	0.395	1213	0.214	1219	0.172	0.005

Table 4 Geographic dispersion and firm survival

The table displays the results of using a Cox proportional-hazards (CPH) model to investigate the impact of a firm's geographic dispersion at the time of going public on the probability of post-IPO failure. The sample includes newly listed firms in the US stock market from 1994 to 2012. Business *Concentration* is calculated using a normalized Herfindahl–Hirschman Index (HHI). *High CONC* is 1 if a firm's business concentration level as measured by HHI is above the sample median, otherwise 0. *GEOSIMILAR* measures the degree of similarity of a firm's geographic dispersion within its industry; *GEOCORR* measures to what extent a firm's economic activities are correlated with local economic shocks. Surviving firms are defined as those continuing to trade at the end of our tracking period (i.e. the end of 2017) (CRSP delisting code 100); acquired firms are those that are delisted for reasons such as M&A (CRSP delisting codes between 200 and 299); failed firms are those delisted for negative reasons, such as bankruptcy and liquidation (CRSP delisting codes equal to or above 300). All regressions are controlled for year and industry effects, whose coefficients are suppressed for brevity. Z-statistics are presented in parentheses below coefficients and a hazard ratio is reported for each variable. One, two and three asterisks denote statistical significance at the 10%, 5% and 1% levels, respectively. All variables are defined in Appendix A.

	(1)		(2)		(3)		(4)	
	Coefficient	Hazard ratio	Coefficient	Hazard ratio	Coefficient	Hazard ratio	Coefficient	Hazard ratio
Concentration	-0.563***	0.569						
	(-3.43)							
High CONC			-0.279***	0.756				
			(-3.53)					
GEOSIMILAR					-0.751***	0.472		
					(-3.90)			
GEOCORR							-0.548***	0.578
							(-3.43)	
Firm age	-0.240***	0.787	-0.236***	0.790	-0.258***	0.772	-0.246***	0.782
	(-4.96)		(-4.87)		(-5.32)		(-5.08)	
Initial return	-0.000	1.000	-0.000	1.000	-0.000	1.000	-0.000	1.000
	(-0.36)		(-0.40)		(-0.25)		(-0.35)	
Proceeds	-0.178**	0.837	-0.175**	0.839	-0.162**	0.850	-0.177**	0.838
	(-3.14)		(-3.08)		(-2.86)		(-3.11)	
Underwriter	-0.211**	0.810	-0.205**	0.814	-0.192*	0.825	-0.211**	0.810
	(-2.08)		(-2.03)		(-1.90)		(-2.08)	
Venture capital	-0.265**	0.767	-0.259**	0.772	-0.249**	0.780	-0.261**	0.770
	(-3.01)		(-2.93)		(-2.83)		(-2.96)	
Auditor	-0.046	0.955	-0.044	0.957	-0.003	0.997	-0.045	0.956
	(-0.56)		(-0.53)		(-0.03)		(-0.55)	
Sales	-0.222***	0.801	-0.220***	0.802	-0.203***	0.817	-0.215***	0.806
	(-6.49)		(-6.44)		(-5.99)		(-6.34)	

Leverage	1.121***	3.068	1.122***	3.072	1.110***	3.035	1.119***	3.063
	(7.63)		(7.63)		(7.67)		(7.57)	
Profitability	-0.510***	0.601	-0.521***	0.594	-0.532***	0.587	-0.504***	0.604
	(-4.65)		(-4.75)		(-4.90)		(-4.57)	
Market-to-book	-0.002**	0.998	-0.002**	0.998	-0.002**	0.998	-0.002**	0.998
	(-2.08)		(-2.14)		(-2.15)		(-2.27)	
Chi-square	455.281		455.540		459.744		455.877	
Wald Chi-square Test Prob>x^2	0.000		0.000		0.000		0.000	
Obs.	2432		2432		2432		2432	

Table 5 Geographic dispersion and firm survival: Information and managerial social interaction

The table displays the results of using a Cox proportional-hazards (CPH) model to investigate the impact of a firm's geographic dispersion in a hard information environment, and the population of the firm's headquarters county on the probability of post-IPO failure. The sample includes newly listed firms in the US stock market from 1994 to 2012. Business *Concentration* is calculated using a normalized Herfindahl–Hirschman Index. We define firms as operating in a hard information environment if the average change of distance at industry level (3-digit) between borrowers and lenders is above the sample median; otherwise, it is a soft information environment. A small (or large) community is defined by whether the population of the firm's headquarters county is below (or above) the sample median. Surviving firms are defined as those continuing to trade at the end of our tracking period (i.e. the end of 2017) (CRSP delisting code 100); acquired firms are those that are delisted for reasons such as M&A (CRSP delisting codes between 200 and 299); failed firms are those that are delisted for negative reasons, such as bankruptcy and liquidation (CRSP delisting codes equal to or above 300). All regressions are controlled for year and industry effects, whose coefficients are suppressed for brevity. Z-statistics are presented in parentheses below coefficients and a hazard ratio is reported for each variable. One, two and three asterisks denote statistical significance at the 10%, 5% and 1% levels, respectively. All variables are defined in Appendix A.

	(1)		(2)		(3)	
	Full sample		Small community		Large community	
	Coefficient	Hazard ratio	Coefficient	Hazard ratio	Coefficient	Hazard ratio
Concentration	-0.391*	0.676	-0.586**	0.557	-0.254	0.776
	(-1.83)		(-1.97)		(-0.79)	
Concentration*Soft information	-0.655**	0.519	-1.172**	0.310	-0.134	0.875
	(-2.00)		(-2.49)		(-0.28)	
Soft information	-0.055	0.946	0.046	1.047	-0.222	0.801
	(-0.32)		(0.19)		(-0.85)	
Firm age	-0.239***	0.787	-0.243***	0.784	-0.258***	0.773
	(-4.94)		(-3.69)		(-3.48)	
Initial return	-0.000	1.000	0.000	1.000	-0.000	1.000
	(-0.29)		(0.14)		(-0.19)	
Proceeds	-0.198***	0.821	-0.181**	0.834	-0.196**	0.822
	(-3.47)		(-2.24)		(-2.30)	
Underwriter	-0.214**	0.807	-0.245	0.782	-0.145	0.865
	(-2.10)		(-1.62)		(-1.02)	
Venture capital	-0.246**	0.782	-0.371**	0.690	-0.200	0.818
	(-2.78)		(-2.97)		(-1.49)	
Auditor	-0.050	0.951	-0.161	0.851	0.035	1.036
	(-0.60)		(-1.39)		(0.28)	
Sales	-0.219***	0.804	-0.221***	0.802	-0.227***	0.797
	(-6.42)		(-4.37)		(-4.56)	
Leverage	1.064***	2.899	1.021***	2.777	1.302***	3.678
	(7.07)		(5.01)		(4.87)	

Profitability	-0.494***	0.610	-0.803***	0.448	-0.401**	0.670
	(-4.45)		(-4.27)		(-2.61)	
Market-to-book	-0.002**	0.998	-0.015**	0.985	-0.002**	0.998
	(-2.33)		(-2.20)		(-2.14)	
Chi-square	470.483		285.851		237.941	
Wald Chi-square Test Prob>x^2	0.000		0.000		0.000	
Obs.	2403		1187		1216	

Table 6 Post-IPO operating performance

The table displays the results of investigating the impact of a firm's geographic dispersion on post-IPO operating performance. The sample includes newly listed firms in the U.S. stock market from 1994 to 2012. Business *Concentration* is calculated using a normalized Herfindahl–Hirschman Index. *High CONC* is 1 if a firm's business concentration level as measured by HHI is above the sample median, otherwise 0. The growth of the IPO firm's post-operating performance is calculated as the change of operating return on assets between the offering year and year *y* less the corresponding change for the matching firm, where operating return on assets is measured as the ratio of operating income before depreciation to total assets. Panel A reports the univariate analysis results; and Panel B shows the results from using ordinary least squares regressions. The post-IPO operating performance measure is winsorized at the top and bottom 1%. All regressions include control variables used in baseline regression analysis, as well as year and industry dummies. One, two and three asterisks denote statistical significance at the 10%, 5% and 1% levels, respectively. The *t*-statistics are included in parentheses and are reported for heteroscedasticity-robust standard errors. All variables are defined in Appendix A.

Panel A Univariate analysis

	(1) Low-concentration IPO firms		(2) High-concentration IPO firms		Diff. in means (1) vs (2) (p-value)
	Obs.	Mean	Obs.	Mean	
IPO year+1	1045	0.307	1082	0.994	0.000
IPO year+2	930	-0.188	952	1.042	0.000
IPO year+3	835	-0.069	873	1.095	0.000

Panel B OLS analysis

	Dependent variable: ∆Operating return on assets		
	IPO year+1	IPO year+2	IPO year+3
Concentration	0.666***	2.163***	0.985***
	(3.10)	(6.40)	(3.18)
Intercept	0.050	-2.459*	-2.391
	(0.08)	(-1.86)	(-1.51)
R-squared	0.025	0.026	0.023
Obs.	2127	1882	1708
High CONC	0.549***	1.071***	1.081***
	(5.74)	(3.54)	(4.56)
Intercept	0.099	-1.964	-2.517
	(0.15)	(-1.31)	(-1.42)
R-squared	0.027	0.026	0.026
Obs.	2127	1882	1708

Table 7 Headquarters size and firm survival

The table displays the results of using a Cox proportional-hazards (CPH) model to investigate the impact of the level of business concentration around the firm headquarters on the probability of post-IPO failure. *HQ%* is the ratio of a firm's HQ state counts to all state citations in the Form 10-K, which measures the degree to which an IPO firm operates its business around its headquarters location. Surviving firms are defined as those continuing to trade at the end of our tracking period (i.e. the end of 2017) (CRSP delisting code 100); acquired firms are those delisted for reasons such as M&A (CRSP delisting codes between 200 and 299); failed firms are those delisted for negative reasons, such as bankruptcy and liquidation (CRSP delisting codes equal to or above 300). All regressions are controlled for year and industry effects, whose coefficients are suppressed for brevity. Z-statistics are presented in parentheses below coefficients and a hazard ratio is reported for each variable. One, two and three asterisks denote statistical significance at the 10%, 5% and 1% levels, respectively. All variables are defined in Appendix A.

	Coefficient	Hazard ratio
HQ%	-0.402**	0.669
	(-3.11)	
Firm age	-0.240***	0.786
	(-4.96)	
Initial return	-0.000	1.000
	(-0.32)	
Proceeds	-0.175**	0.839
	(-3.08)	
Underwriter	-0.213**	0.808
	(-2.11)	
Venture capital	-0.264**	0.768
	(-2.99)	
Auditor	-0.035	0.965
	(-0.42)	
Sales	-0.218***	0.805
	(-6.39)	
Leverage	1.121***	3.067
	(7.64)	
Profitability	-0.516***	0.597
	(-4.70)	
Market-to-book	-0.002**	0.998
	(-2.10)	
Chi-square	452.757	
Wald Chi-square Test Prob>x^2	0.000	
Obs.	2432	

Table 8 Geographic dispersion and firm survival: Controlling for high-tech firms

The table displays the results of using a Cox proportional-hazards (CPH) model to investigate the impact of a firm's geographic dispersion on the probability of post-IPO failure, controlling for high-tech industries. *High-tech* takes a value of 1 if the firm operates in a high-tech industry, otherwise it is 0. The sample includes newly listed firms in the U.S. stock market from 1994 to 2012. Surviving firms are defined as those continuing to trade at the end of our tracking period (i.e. the end of 2017) (CRSP delisting code 100); acquired firms are those delisted for reasons such as M&A (CRSP delisting codes between 200 and 299); failed firms are those delisted for negative reasons, such as bankruptcy and liquidation (CRSP delisting code equal to or above 300). All regressions are controlled for year and industry effects, whose coefficients are suppressed for brevity. Z-statistics are presented in parentheses below coefficients and a hazard ratio is reported for each variable. One, two and three asterisks denote statistical significance at the 10%, 5% and 1% levels, respectively. All variables are defined in Appendix A.

	(1)		(2)		(3)	
	Full sample		High-tech		Non-high-tech	
	Coefficient	Hazard ratio	Coefficient	Hazard ratio	Coefficient	Hazard ratio
Concentration	-0.572**	0.564	-0.699**	0.497	-0.494**	0.610
	(-2.61)		(-2.84)		(-2.22)	
Concentration*High-tech	-0.086	0.918				
	(-0.27)					
High-tech	-0.047	0.954				
	(-0.28)					
Firm age	-0.232***	0.793	-0.239**	0.787	-0.213***	0.808
	(-4.80)		(-2.65)		(-3.69)	
Initial return	-0.000	1.000	-0.002**	0.998	0.000	1.000
	(-0.30)		(-2.13)		(0.39)	
Proceeds	-0.222***	0.801	-0.010	0.990	-0.316***	0.729
	(-3.99)		(-0.11)		(-4.40)	
Underwriter	-0.231**	0.793	-0.177	0.838	-0.238	0.788
	(-2.30)		(-1.23)		(-1.63)	
Venture capital	-0.323***	0.724	-0.290**	0.748	-0.359**	0.699
	(-3.72)		(-2.29)		(-2.84)	
Auditor	-0.077	0.926	0.111	1.118	-0.225**	0.798
	(-0.95)		(0.87)		(-2.07)	
Sales	-0.150***	0.861	-0.198***	0.820	-0.144***	0.866
	(-4.63)		(-3.57)		(-3.46)	
Leverage	1.096***	2.992	0.706**	2.025	1.231***	3.425
	(7.47)		(2.41)		(7.16)	
Profitability	-0.514***	0.598	-0.844***	0.430	-0.327**	0.721
	(-4.79)		(-5.11)		(-1.98)	
Market-to-book	-0.002**	0.998	-0.002	0.998	-0.010	0.990
	(-2.06)		(-1.64)		(-1.56)	
Chi-square	402.678		200.101		263.468	
Wald Chi-square Test Prob>x^2	0.000		0.000		0.000	
Obs.	2432		1189		1243	

Table 9 Geographic dispersion and firm survival: Controlling for industrial and international diversifications

The table displays the results using a Cox proportional-hazards (CPH) model to investigate the impact of a firm's geographic dispersion on the probability of post-IPO failure, controlling for industrial and international diversifications. The sample includes newly listed firms in the US stock market from 1994 to 2012. Business *Concentration* is calculated using a normalized Herfindahl–Hirschman Index. *IndustrySEG* is the number of industries in which a firm is involved. *Intl.SEG* is the number of geographic segments of a firm. Surviving firms are defined as those continuing to trade at the end of our tracking period (i.e. the end of 2017) (CRSP delisting code 100); acquired firms are those delisted for reasons such as M&A (CRSP delisting codes between 200 and 299); failed firms are those delisted for negative reasons, such as bankruptcy and liquidation (CRSP delisting codes equal to or above 300). All regressions are controlled for year and industry effects, whose coefficients are suppressed for brevity. Z-statistics are presented in parentheses below coefficients and a hazard ratio is reported for each variable. One, two and three asterisks denote statistical significance at the 10%, 5% and 1% levels, respectively. All variables are defined in Appendix A.

	Coefficient	Hazard ratio
Concentration	-0.564**	0.569
	(-3.27)	
Firm age	-0.212***	0.809
	(-4.17)	
Initial return	-0.000	1.000
	(-0.17)	
Proceeds	-0.195**	0.823
	(-3.11)	
Underwriter	-0.168	0.845
	(-1.51)	
Venture capital	-0.336***	0.714
	(-3.55)	
Auditor	-0.016	0.984
	(-0.18)	
Sales	-0.259***	0.772
	(-6.62)	
Leverage	1.120***	3.064
	(7.10)	
Profitability	-0.372**	0.689
	(-3.05)	
Market-to-book	-0.002*	0.998
	(-1.92)	
Intl.SEG	-0.009	0.991
	(-0.24)	
IndustrySEG	-0.056	0.945
	(-1.00)	
Chi-square	404.304	
Wald Chi-square Test Prob>x^2	0.000	
Obs.	2045	

Table 10 Propensity score matching

The table displays the results of using propensity score matching to investigate the impact of geographic dispersion of firms on the probability of post-IPO failure. We divide the sample into low- and high-concentration business groups: firms belong to the high-concentration group if their HHI-based geographic-dispersion measure is above the median value; otherwise, they belong to the low-concentration group. The variables used for the matching process include *Firm age*, *Initial return, Proceeds*, *Venture capital*, *Underwriter*, *Auditor*, *Sales*, *Leverage*, *Profitability*, *Market-to-book, Intl.SEG*, *IndustrySEG*, *year and industry dummies.* Surviving firms are defined as those continuing to trade at the end of our tracking period (CRSP delisting code 100); acquired firms are those delisted for reasons such as M&A (CRSP delisting codes between 200 and 299); failed firms are those delisted for negative reasons, such as bankruptcy and liquidation (CRSP delisting codes equal to or above 300). Z-statistics are presented in parentheses below coefficients. One, two and three asterisks denote statistical significance at the 10%, 5% and 1% levels, respectively. All variables are defined in Appendix A.

ATET	
High-concentration vs. Low-concentration firms	-0.074**
(1 vs. 0)	(-2.27)
Observations	2039

Table 11 Geographic dispersion and firm survival: Alternative dispersion measures

The table displays the results of using a Cox proportional-hazards (CPH) model to investigate the impact of a firm's geographic dispersion on the probability of post-IPO failure using alternative measures. The sample includes newly listed firms in the US stock market from 1993 to 2012. *NState* is the number of states in which an IPO firm has geographically dispersed business interests as mentioned in the Form 10-K. *Region* is a count variable indicating the number of different regions in which the firm has dispersed business interests. *Local* takes a value of 1 if a firm's business interests are in one or two states only, otherwise 0. *Concentration(GDP)* is a GDP-weighted normalized HHI. *Concentration(Subs)* is the HHI index calculated using firm's subsidiaries as reported in Exhibit 21 of Form 10-K. All regressions are controlled for year and industry effects, whose coefficients are suppressed for brevity. Z-statistics are presented in parentheses below coefficients and a hazard ratio is reported for each variable. One, two and three asterisks denote statistical significance at the 10%, 5% and 1% levels, respectively. All variables are defined in Appendix A.

	(1)		(2)		(3)		(4)		(5)	
	Coefficient	Hazard ratio	Coefficient	Hazard ratio	Coefficient	Hazard ratio	Coefficient	Hazard ratio	Coefficient	Hazard ratio
NState	0.034***	1.034								
	(5.29)									
Region			0.091***	1.095						
			(4.67)							
Local					-0.176*	0.839				
					(-1.93)					
Concentration (GDP)							-0.0002**	0.999		
							(-2.17)			
Concentration (Subs)									-0.351*	0.704
									(-1.68)	
Firm age	-0.237***	0.789	-0.239***	0.787	-0.248***	0.780	-0.252***	0.777	-0.300***	0.740
	(-4.90)		(-4.96)		(-5.11)		(-5.19)		(-4.06)	
Initial return	-0.000	1.000	-0.000	1.000	-0.000	1.000	-0.000	1.000	-0.001	0.999
	(-0.28)		(-0.36)		(-0.29)		(-0.23)		(-0.64)	
Proceeds	-0.201***	0.818	-0.189***	0.827	-0.170**	0.843	-0.174**	0.840	-0.062	0.940
	(-3.50)		(-3.32)		(-2.99)		(-3.06)		(-0.68)	
Underwriter	-0.197*	0.821	-0.206**	0.814	-0.210**	0.811	-0.202**	0.817	-0.098	0.907
	(-1.94)		(-2.04)		(-2.07)		(-2.00)		(-0.62)	
Venture capital	-0.267**	0.766	-0.269**	0.764	-0.268**	0.765	-0.257**	0.773	-0.123	0.884
	(-3.04)		(-3.06)		(-3.04)		(-2.91)		(-0.84)	
Auditor	-0.041	0.960	-0.043	0.958	-0.036	0.964	-0.020	0.980	0.172	1.188
	(-0.49)		(-0.52)		(-0.44)		(-0.24)		(1.25)	
Sales	-0.222***	0.801	-0.221***	0.802	-0.212***	0.809	-0.208***	0.813	-0.224***	0.799
	(-6.48)		(-6.47)		(-6.23)		(-6.12)		(-3.99)	
	1.127***	3.087	1.123***	3.076	1.132***	3.102	1.113***	3.045	0.904***	2.469

Leverage										
	(7.59)		(7.58)		(7.72)		(7.66)		(4.13)	
Profitability	-0.543***	0.581	-0.533***	0.587	-0.518***	0.596	-0.528***	0.590	-0.585**	0.557
	(-4.97)		(-4.87)		(-4.74)		(-4.85)		(-3.14)	
Market-to-book	-0.002**	0.998	-0.002**	0.998	-0.002**	0.998	-0.002**	0.998	-0.005*	0.995
	(-2.32)		(-2.36)		(-2.39)		(-2.02)		(-1.72)	
Chi-square	467.508		464.239		446.934		448.209		187.503	
Wald Chi-square Test Prob>x^2	0.000		0.000		0.000		0.000		0.000	
Obs.	2432		2432		2432		2432		1087	

Appendix A: Variable definitions

Panel A: Geographic dispersion	
Concentration	Following Platikanova and Mattei (2016), we measure the degree of a firm's geographic dispersion using a normalized Herfindahl–Hirschman Index (HHI) based on the state citations. The variable ranges from zero to one, where the lower values indicate higher levels of geographic dispersion across different states. The value takes value 1 if the firm's business is concentrated solely at the headquarters location.
High CONC	A dummy variable taking value 1 if a firm is highly concentrated, otherwise 0. We define a firm as being in the high-concentration group if its HHI index is above the sample median; otherwise, it is in the low-concentration group.
GEOSIMILAR	Following Platikanova and Matter (2016), the variable measures the degree of similarity of a firm's geographic dispersion within its specific industry at 3-digit SIC level.
GEOCORR	Following Platikanova and Matter (2016), the variable measures to what extent a firm's economic activities are correlated with local economic shocks.
Soft information	A dummy variable taking value 1 if the firm operates in a soft information environment, otherwise 0. Following Landier et al. (2009), we classify an industry as belonging to a soft information environment if the mean change of distance between primary lenders and borrowers is below the median value, and in a hard information environment if it is above.
Community	A dummy variable taking value 1 if the firm is located in a large community, otherwise 0. We define a firm as located in a large community if the county population of its headquarters is above the sample median; otherwise, it is in a small community.
HQ%	The ratio of a firm's HQ state counts to all state citations in the Form 10-K filing, which measures the extent to which an IPO firm operates its business around its headquarters location.
IndustrySEG	The number of industries in which a firm is involved.
Intl.SEG	The number of a firm's international geographic segments.
NState	The number of different states mentioned in the Form 10-K for an IPO firm.
Region	A count variable indicating in how many different regions a firm has businesses.
Local	A dummy variable taking value 1 if a firm has two or fewer states mentioned in its Form 10-K filing, otherwise 0.
Concentration (GDP)	GDP-weighted normalized Herfindahl–Hirschman Index.
Concentration (Subs)	A normalized Herfindahl–Hirschman Index using distribution of IPO firm's subsidiaries across different states. The data is hand-collected from Exhibit 21 of Form 10-K.

Panel B: Firm and offering characteristics	
Firm age	Natural logarithm of one plus IPO firm age. The firm age is measured as number of years between firm's founding year and IPO year.
Initial return	Percentage change between the stock price from the first day of trading and the offer price.
Proceeds	Natural logarithm of total proceeds that a firm raised at the time of IPO.
Venture capital	A dummy variable indicating whether the IPO firm is venture-backed.
Underwriter	A dummy variable indicating whether the IPO is supported by underwriters ranked above 8 on Jay Ritter's website.
Auditor	A dummy variable indicating whether the IPO uses a Big Four auditing firm.
Sales	Natural logarithm of sales in the IPO year.
Leverage	The ratio of total debts to total assets in the IPO year.

Profitability	The ratio of earnings before interest, taxes, depreciation, and amortization (EBITDA) to total assets in the IPO year.
Market-to-book	The ratio of a firm's market value to its book value in the IPO year.
Operating return on assets	The ratio of operating income before depreciation to total assets.
IPO failure	A dummy variable taking value 1 if a firm is delisted due to negative reaons within five years after lisiting, otherwise 0.

Appendix B Correlation matrix

The table displays the correlation matrix for the variables used in our analysis.

	Concentration	Firm Age	Initial return	Proceeds	Underwriter	Venture capital	Auditor	Sale	Leverage	Profitability	Market-to-Book
Concentration	1										
Firm Age	-0.081	1									
Initial return	-0.026	-0.136	1								
Proceeds	-0.236	0.250	0.073	1							
Underwriter	-0.094	0.066	0.161	0.441	1						
Venture capital	0.100	-0.220	0.125	0.036	0.108	1					
Auditor	-0.050	0.031	0.047	0.267	0.183	0.198	1				
Sale	-0.269	0.455	-0.021	0.616	0.301	-0.277	0.112	1			
Leverage	-0.139	0.251	-0.138	0.185	0.075	-0.249	-0.020	0.398	1		
Profitability	-0.100	0.315	-0.053	0.245	0.071	-0.269	0.009	0.542	-0.042	1	
Market-to-Book	-0.023	-0.051	0.115	-0.0003	0.050	0.031	0.022	-0.014	0.0008	-0.107	1

Appendix C Geographic dispersion and firm survival: Redefined firm failure

The table displays the results of using a Cox proportional-hazards (CPH) model to investigate the impact of a firm's geographic dispersion on the probability of post-IPO failure. The sample includes newly listed firms in the U.S. stock market from 1994 to 2012. Business *Concentration* is calculated using a normalized Herfindahl–Hirschman Index. In specification (1), failed firms are redefined to include those firms delisted due to M&As (with CRSP delisting codes between 200 and 299, or equal to or above 300); in specification (2), M&As are excluded from the sample. Surviving firms are defined as those continuing to trade at the end of our tracking period (i.e. the end of 2017) (CRSP delisting code 100). All regressions are controlled for year and industry effects, whose coefficients are suppressed for brevity. Z-statistics are presented in parentheses below coefficients and a hazard ratio is reported for each variable. One, two and three asterisks denote statistical significance at the 10%, 5% and 1% levels, respectively. All variables are defined in Appendix A.

	(1)		(2)	
	M&As left-censored		M&As excl. from sample	
	Coefficient	Hazard ratio	Coefficient	Hazard ratio
Concentration	-0.326**	0.722	-0.426***	0.653
	(-3.25)		(-3.50)	
Firm age	-0.146***	0.864	-0.184***	0.832
	(-4.85)		(-5.04)	
Initial return	-0.000	1.000	0.000	1.000
	(-0.15)		(1.00)	
Proceeds	-0.047	0.954	-0.105**	0.901
	(-1.35)		(-2.45)	
Underwriter	-0.097*	0.908	-0.100	0.905
	(-1.73)		(-1.45)	
Venture capital	-0.006	0.994	-0.084	0.919
	(-0.10)		(-1.31)	
Auditor	0.020	1.020	0.006	1.006
	(0.38)		(0.09)	
Sales	-0.055**	0.946	-0.104***	0.901
	(-2.49)		(-3.91)	
Leverage	0.416***	1.516	0.591***	1.806
	(4.63)		(5.07)	
Profitability	-0.223**	0.800	-0.264**	0.768
	(-2.51)		(-2.51)	
Market-to-book	-0.001*	0.999	-0.002**	0.998
	(-1.66)		(-1.98)	
Chi-square	208.864		252.985	
Wald Chi-square Test Prob>x^2	0.000		0.000	
Obs.	2432		1825	

Appendix D Geographic dispersion and firm survival: AFT and Logit models

The table displays the results of using Accelerated Failure Time (AFT) and logit models to investigate the impact of a firm's geographic dispersion on the probability of post-IPO failure. The sample includes newly listed firms in the U.S. stock market from 1994 to 2012. Business *Concentration* is calculated using a normalized Herfindahl–Hirschman Index. Surviving firms are defined as those continuing to trade at the end of our tracking period (i.e. the end of 2017) (CRSP delisting code 100); acquired firms are those delisted for reasons such as M&A (CRSP delisting codes between 200 and 299); failed firms are those delisted for negative reasons, such as bankruptcy and liquidation (CRSP delisting codes equal to or above 300). All regressions are controlled for year and industry effects, whose coefficients are suppressed for brevity. Z-statistics are presented in parentheses below coefficients, and a time ratio is reported for each variable (for the AFT model only). One, two and three asterisks denote statistical significance at the 10%, 5% and 1% levels, respectively. All variables are defined in Appendix A.

	(1)		(2)
	AFT model		Logit model
	Coefficient	Time ratio	Coefficient
Concentration	0.498***	1.645	-0.529**
	(3.72)		(-2.44)
Firm age	0.232***	1.261	-0.197**
	(5.80)		(-3.05)
Initial return	0.001	1.001	-0.000
	(1.06)		(-0.37)
Proceeds	0.151**	1.163	-0.290***
	(3.28)		(-3.70)
Underwriter	0.158**	1.171	-0.174
	(1.98)		(-1.45)
Venture capital	0.212**	1.236	-0.438***
	(2.96)		(-3.72)
Auditor	0.059	1.061	-0.079
	(0.86)		(-0.72)
Sales	0.150***	1.162	-0.270***
	(5.08)		(-5.54)
Leverage	-0.919***	0.399	1.223***
	(-6.75)		(5.58)
Profitability	0.555***	1.742	-0.893***
	(4.68)		(-3.34)
Market-to-book	0.942*	1.002	-0.001
	(1.80)		(-0.51)
Intercept	0.984		2.996***
	(1.42)		(3.49)
Chi-square	450.501		-
Wald Chi-square Test Prob>x^2	0.000		-
Pseudo R-squared	-		0.154
Obs.	2432		2432

Appendix E Geographic dispersion and firm survival: Failures within five years after listing

The table displays the results of using CPH, Accelerated Failure Time (AFT) and logit models to investigate the impact of a firm's geographic dispersion on the probability of post-IPO failure within five years of listing. The sample includes newly listed firms in the U.S. stock market from 1994 to 2012. Business *Concentration* is calculated using a normalized Herfindahl–Hirschman Index. Surviving firms are defined as those continuing to trade up to five years after listing (CRSP delisting code 100); acquired firms are those delisted for reasons such as M&A (CRSP delisting codes between 200 and 299); failed firms are those delisted for negative reasons, such as bankruptcy and liquidation (CRSP delisting codes equal to or above 300). All regressions are controlled for year and industry effects, whose coefficients are suppressed for brevity. Z-statistics are presented in parentheses below coefficients. A hazard ratio (or time ratio for the AFT model) is reported for each variable for the CPH (AFT) model. One, two and three asterisks denote statistical significance at the 10%, 5% and 1% levels, respectively. All variables are defined in Appendix A.

	CPH model		AFT model		Logit model
	Coefficient	Hazard ratio	Coefficient	Time ratio	Coefficient
Concentration	-0.717***	0.488	0.827***	2.286	-0.927***
	(-3.47)		(4.00)		(-3.46)
Firm age	-0.369***	0.691	0.409***	1.505	-0.420***
	(-6.14)		(6.63)		(-5.55)
Initial return	-0.001	0.999	0.001	1.001	-0.000
	(-0.79)		(0.87)		(-0.28)
Proceeds	-0.186**	0.830	0.208**	1.232	-0.297***
	(-2.68)		(2.95)		(-3.32)
Underwriter	-0.147	0.863	0.155	1.167	-0.119
	(-1.14)		(1.26)		(-0.85)
Venture capital	-0.327**	0.721	0.298**	1.347	-0.418**
	(-2.95)		(2.74)		(-2.99)
Auditor	-0.102	0.903	0.093	1.097	-0.137
	(-0.99)		(0.89)		(-1.09)
Sales	-0.226***	0.798	0.195***	1.216	-0.256***
	(-5.41)		(4.40)		(-4.56)
Leverage	1.233***	3.430	-1.279***	0.278	1.449***
	(7.34)		(-6.31)		(6.06)
Profitability	-0.555***	0.574	0.748***	2.113	-0.839**
	(-4.50)		(4.32)		(-2.93)
Market-to-book	-0.003**	0.997	0.004**	1.004	-0.004
	(-2.42)		(2.03)		(-1.50)
Intercept	-		0.984		1.932**
	-		(1.23)		(2.06)
Chi-square	425.891		407.009		-
Wald Chi-square Test Prob>x^2	0.000		0.000		-
Pseudo R-square	-		-		0.170
Obs.	2432		2432		2424

Appendix F Geographic dispersion and firm survival: consider state fix effect

The table displays the results of using CPH, Accelerated Failure Time (AFT) and logit models to investigate the impact of a firm's geographic dispersion on the probability of post-IPO failure by specifically considering state fix effect. The sample includes newly listed firms in the U.S. stock market from 1994 to 2012. Business *Concentration* is calculated using a normalized Herfindahl–Hirschman Index. Surviving firms are defined as those continuing to trade up to five years after listing (CRSP delisting code 100); acquired firms are those delisted for reasons such as M&A (CRSP delisting codes between 200 and 299); failed firms are those delisted for negative reasons, such as bankruptcy and liquidation (CRSP delisting codes equal to or above 300). All regressions are controlled for year, industry and state effects, whose coefficients are suppressed for brevity. Z-statistics are presented in parentheses below coefficients. A hazard ratio (or time ratio for the AFT model) is reported for each variable for the CPH (AFT) model. One, two and three asterisks denote statistical significance at the 10%, 5% and 1% levels, respectively. All variables are defined in Appendix A.

	CPH model		AFT model		Logit model
	Coefficient	Hazard ratio	Coefficient	Time ratio	Coefficient
Concentration	-0.548**	0.578	0.475***	1.609	-0.477**
	(-3.26)		(3.50)		(-2.13)
Firm Age	-0.229***	0.795	0.218***	1.243	-0.179**
	(-4.65)		(5.39)		(-2.71)
Initial return	-0.000	1.000	0.001	1.001	-0.000
	(-0.50)		(1.18)		(-0.30)
Proceeds	-0.183**	0.832	0.154**	1.167	-0.331***
	(-3.09)		(3.29)		(-4.04)
Underwriter	-0.202**	0.817	0.141*	1.151	-0.152
	(-1.96)		(1.76)		(-1.23)
Venture capital	-0.230**	0.795	0.181**	1.199	-0.359**
	(-2.50)		(2.45)		(-2.89)
Auditor	-0.026	0.975	0.048	1.049	-0.054
	(-0.30)		(0.69)		(-0.47)
Sale	-0.228***	0.796	0.153***	1.165	-0.269***
	(-6.53)		(5.14)		(-5.36)
Leverage	1.152***	3.166	-0.927***	0.396	1.209***
	(7.51)		(-6.79)		(5.49)
Profitability	-0.494***	0.610	0.547***	1.728	-0.945***
	(-4.46)		(4.62)		(-3.33)
Market-to-Book	-0.002*	0.998	0.002*	1.002	-0.001
	(-1.96)		(1.67)		(-0.65)
Intercept			1.265		2.519
			(1.41)		(1.47)
Chi-square	505.367		495.755		-
Wald Chi-square Test					
Prob>x^2	0.000		0.000		-
Pseudo R-square	-		-		0.168
No of Obs	2432		2432		2414

Appendix G Distribution of state citations for sample firms

The table displays the frequency of each state citation in the Form 10-Ks of our sample.

State	Frequency	Percentage
California	1457	9.71
Delaware	1261	8.40
New York	899	5.99
Texas	847	5.65
Washington	704	4.69
Massachusetts	566	3.77
Illinois	552	3.68
Florida	527	3.51
Georgia	437	2.91
Pennsylvania	430	2.87
New Jersey	421	2.81
Virginia	418	2.79
Colorado	410	2.73
North Carolina	348	2.32
Michigan	329	2.19
Ohio	310	2.07
Arizona	306	2.04
Maryland	299	1.99
Connecticut	261	1.74
Oregon	238	1.59
Minnesota	237	1.58
Indiana	230	1.53
Tennessee	228	1.52
Kansas	203	1.35
Nevada	200	1.33
Missouri	196	1.31
Wisconsin	191	1.27
Louisiana	186	1.24
Oklahoma	181	1.21
Utah	165	1.10
Kentucky	157	1.05
Maine	157	1.05
South Carolina	153	1.02
Alabama	149	0.99
New Mexico	147	0.98
Mississippi	125	0.83
Iowa	122	0.81
Arkansas	116	0.77
New Hampshire	108	0.72
Nebraska	101	0.67
Idaho	88	0.59
Hawaii	72	0.48
Rhode Island	67	0.45
Montana	66	0.44
West Virginia	66	0.44
Alaska	63	0.42
Wyoming	61	0.41
Vermont	51	0.34
South Dakota	50	0.33
North Dakota	47	0.31

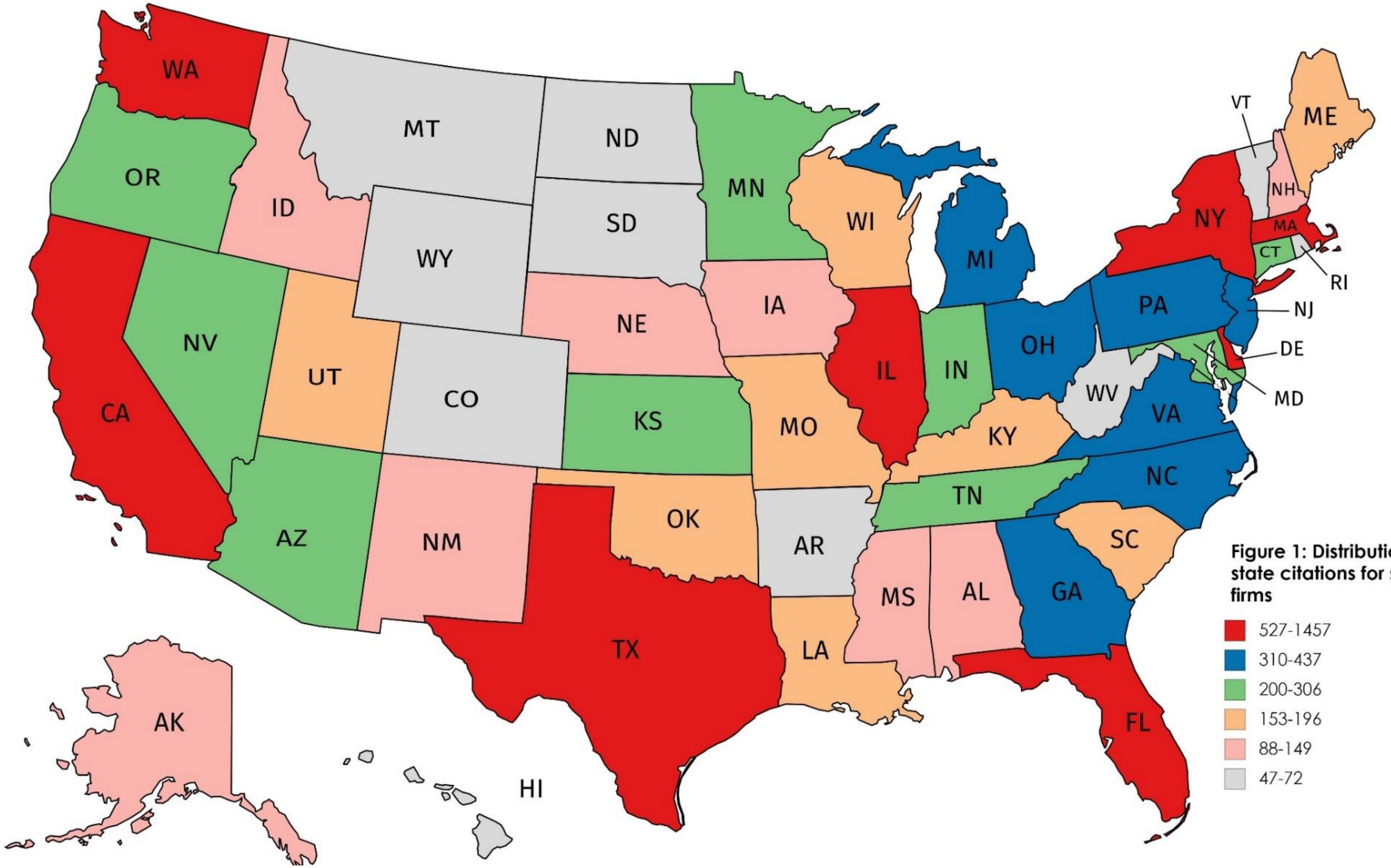


Figure 1: Distribution of state citations for sample firms

Chapter 4 The costs of monitoring failures: Discredited venture capitalists and IPO performance

4.1 Introduction

Initial public offerings (IPO) is the most attractive way for venture capitalists (VC) to cash out from their portfolio firms, as returns from IPO are much higher than other exit routes (e.g., M&As) (Lopez-de-Silanes, Phalippou and Gottschalg, 2015). Previous studies suggest that VCs are value adding financial intermediary through their reputation and expertise (Gorman and Sahlman (1989); Lerner (1995); Hellmann and Puri (2002); Bottazzi, Da Rin and Hellmann (2008)), thereby helping IPO firms to achieve better corporate performance (e.g., Loughran and Ritter (1995); Brav and Gompers (1997); Bottazzi and Da Rin (2002); Krishnan et al. (2011)).

Nevertheless, some studies also argue that VCs' reputation can be destroyed through which they make mistakes, such as failing to monitor the portfolio firms. Tian, Udell and Yu (2016) use VCs who failed to prevent IPO frauds and subsequently was sued as a proxy for inefficient monitors and find that those VCs are less likely to bring investee firms to the public capital market. Other studies, such as Atanasov, Ivanov and Litvak (2012), also present a similar argument that litigation can affect either VCs' or investees' performance, thereby reducing the likelihood to conduct the IPO. However, these studies do not focus on IPO performance when VCs are recognized as inefficient monitors. Thus, this study fills the gap by showing how reputation damaged VCs affect the IPO performance of their backed portfolio firms.

We use a sample of VC-backed IPOs between 1993 and 2015, and measure detected IPO fraud as the lawsuits occurred within two years after going public. We defined discredited VCs as those who failed to prevent their backed IPOs from being sued due to IPO frauds, which subsequently results in the reputation damage for them. This approach is similar to that of Tian, Udell and Yu (2016). We find evidence that discredited VC-backed IPOs experience interior performance around and after the initial public offering event.

Information asymmetry is the most prominent characteristic of the IPO market. When there is more significant information disparity between issuers and investors, underwriters leave higher returns to investors as the compensation for collecting the information in the market, known as “money left on the table”. However, issuers suffer losses because they can potentially raise more capital. In this regard, we reveal that the participation of discredited VCs in IPO firms increases information asymmetry and lowers investors’ confidence about the new issue, resulting in higher IPO underpricing. This translates a US $16.3 million potential loss compared to their counterparts without any discredited VCs. Further, we find a positive relationship between discredited VC-backed IPOs and offer price revisions, which implies that there is a high demand for information extraction from investors for discredited VC-backed IPOs. The evidence is aligned with previous studies which argue that underwriters partially adjust offer price revisions in order to induce private information from the informed investors (e.g., Hanley (1993)).

Apart from reputation damage concerns, we further question the managerial ability of discredited VCs. Tian, Udell and Yu (2016) argue that limited partners distribute less funding to VCs who had monitoring failure experience. Because discredited VCs failed to detect and prevent IPO fraud in their supported firms, which may suggest that these VCs do not possess enough ability to manage the firm. First, we find the ability for discredited VC-backed firms to generate profits based on the investments is worse than their counterparts without any discredited VCs in the post-IPO periods. Second, investors do not benefit from the shares they held in IPOs with discredited VCs, as the buy and hold abnormal returns (BHARs) are much lower for those stocks. Finally, we employ a Cox proportional hazard model to explore failure risks. We find that IPO firms with discredited VCs invested makes it 1.431 times more likely that such firms will fail compared to firms without discredited VCs.

We also investigate why discredited VCs can tolerate higher underpricing. Our evidence firstly reveals that discredited VC-backed IPOs are more likely to be involved in lawsuits within two years after the offering. This is consistent with the argument of the lack of managerial ability of those VCs. Further, we find that this litigation-effect can be mitigated by the higher underpricing incurred around the IPO, which suggests that discredited VCs take advantage of high underpricing to avoid further lawsuits.

Our study makes several contributions to the related literature. Previous studies which have examined the behavior of reputation damaged VCs only focus on the outcome of exit possibility (e.g., whether can cash out through the IPO successfully) (e.g., see, Atanasov, Ivanov and Litvak (2012); Tian, Udell and Yu (2016)). However, it is unclear how those VCs affect the performance of IPO firms. To our best knowledge, we are the first to investigate the relationship between the discredited VCs and IPO performance. Moreover, many studies suggest that VCs provide value adding service to their portfolio firms, especially in IPOs (e.g., Hellmann and Puri (2002); Bottazzi, Da Rin and Hellmann (2008)). Our study suggests that not all VCs are able to add values to IPO firms. In this regard, we reveal that both the reputation and managerial ability matter for discredited VCs, as their backed IPOs incur high underpricing and experience declined performance in the post-offering periods, which ultimately result in IPO failures.

Our study is also related to another stream of literature which suggests the use of IPO underpricing as issuance channel to avoid future lawsuits. Lowry and Shu (2002) document that underpricing is an efficient hedge for newly listed firms to mitigate litigation risks. Hanley and Hoberg (2012) argue that underwriters use offer price revisions to satisfy investors in order to avoid post-IPO lawsuits. Our study, therefore, adds additional evidence to this stream of literature that discredited VC-backed IPOs with more “money left on the table” are less likely to be sued by investors after going public.

The rest of the study is arranged as follows. Section 2 summarizes related literature in IPO litigation and firm performance, including the aspect of VCs. Section 3 develops our main hypothesis. Section 4 shows our sample construction and descriptive statistics. We present our empirical analysis results in section 4. Finally, section 5 provides a conclusion for the study.

4.2 Related Literature

Previous studies have examined the impact of litigation which is directly or indirectly faced by firms on corporate performance. Bhagat, Bizjak and Coles (1998) document that firms experience economically meaningful losses when they are litigated and the litigation filling is announced. However, they find that firm size is negatively associated with such defendant wealth loss effect, which may indicate a stronger bargaining power for larger firms.

Previous literature also focuses on the relationship between litigation and VCs from different research angles. Atanasov, Ivanov and Litvak (2012) find a negative relationship between the reputation of VCs and the probability of those VCs to face litigations. Moreover, they document that defendant VCs face difficulties to raise capital and invest in deals with much lower quality. Tian, Udell and Yu (2016) investigate the consequence of the failure of monitoring for VCs. Specifically, they document that VCs who failed to prevent accounting fraud in their backed IPO firms receive pressures from limited partners (LPs) by attracting less funding and making more concentrated investments (e.g., in the same industry, or invest locally). Moreover, those VCs' future investments are less likely to make a successful exit, including cashing out through IPOs or M&As. They conclude that the failure of monitoring makes VCs suffer reputation damages in the financial market. Apart from these two studies which focus on the defendant VCs, Cumming, Haslem and Knill (2017) investigate how the firm's litigation affect VC financing. They find that VCs are more (less) likely to invest in firms that litigate after (before) obtaining investments from venture capital. Moreover, their study reveals that VCs deem firms which filed litigations as risky ones because they tend to invest with more financing rounds in those firms.

Furthermore, some studies also explore the relation between IPO performance and another important financial intermediary in the market, which is underwriters. In general, underwriters are usually repeated market participates which have accumulated abundant experience in marketing and pricing new shares (e.g., Welch (1992); Cook, Kieschnick and Van Ness (2006)). In this regard, newly listed firms prefer to select premium service from top-ranked underwriters. Beatty and Ritter (1986) argue that underwriters have reputation capital at stake, which affect their decision to balance the level of IPO initial returns. In a later study, Carter, Dark and Singh (1998) find that IPO firms managed by prestigious underwriters experience better long-run performance and less initial returns. However, Beatty, Bunsis and Hand (1998) document that when underwaters are involved in SEC investigations, the stock performance of their past clients is significantly negatively affected. The evidence suggests that the underwriter's reputation is not stationary. Overall, the extant literature reveals the importance of the reputation of financial intermediaries in the market, such as venture capitalist and underwriters. In the following section, we develop hypothesis that relate to how reputation damaged VCs affect IPO performance.

4.3 Hypothesis development

4.3.1 Reputation caused information asymmetry

Reputation stake is critically important for VCs. Hsu (2004) finds that start-ups are willing to take a valuation discount on their firms for the exchange of financing from reputable VCs. Nahata (2008) reveals that VC's reputation provides entrepreneurs with a fast track to the initial public offerings and have higher productivity at the time of going public. However, VC's reputation can also be destroyed through different means, such as failing to play the certification and monitor roles in their portfolio firms (e.g., Tian, Udell and Yu (2016)). If investors find an IPO firm of which they are interested in investing has VCs who failed to monitor their portfolio firms in the past, this will undoubtedly increase the valuation uncertainty of the new issue. Investors may not feel confident about the quality of the IPO because they could raise doubt about the ability of reputation-damaged VCs.

The IPO market is characterized by high information disparity. Insiders always possess sufficient internal information regarding new issues over investors. When the market information asymmetry is high, investors are eager for the private information of the offering. They may use different means to collect information from the market at a higher cost. Thus, the result of high IPO underpricing is deemed as the compensation to investors for the information collection (e.g., Benveniste and Spindt (1989); Benveniste, Busaba and Wilhelm Jr (2002); Benveniste et al. (2003)). Therefore, investors may require a higher premium from discredited VC-backed IPO firms. Based on the argument above, we develop our first hypothesis:

H 1: IPO firms with discredited VC invested incur higher underpricing on the first day of trading.

During the bookbuilding process, underwriters rely on adjusting offer price revisions to induce private information from investors (Hanley, 1993). To the extent that reputation-damaged VCs increases information asymmetry between issuers and investors, underwriters are more likely to be motivated to take advantage of revisions to extract useful information during road shows. Moreover, Tian, Udell and Yu (2016) document that prestigious underwriters are less likely to cooperate with VCs who failed to present their backed IPOs from being sued. This evidence implies that underwriters may not know very well about discredited VCs and they prefer to stay away from their backed IPOs. Thus, extracting private information from informed investors becomes vitally important for underwriters during the bookbuilding process. We develop our second hypothesis:

H 2: Due to high information asymmetry and the incentive for underwriters to extract information, the degree of offer price revision is higher for discredited VC-backed IPOs.

4.3.2 Managerial ability concerns

VCs are recognized as value-adding intermediaries in the financial market. They add values to portfolio firms in different ways. For instance, VCs often send their representatives to take board positions as an independent director in order to control and manage the portfolio firm (e.g., Gorman and Sahlman (1989); Hochberg (2011)). Hellmann and Puri (2002) find that VCs are more likely to replace a founder with a professional CEO in their invested firms. If VCs failed to prevent IPO frauds in their backed firms, this does not only translate reputation damages to VCs but also may represent a problem with VC’s managerial ability. In other words, they may not have sufficient knowledge to manage the firm. Because VCs generally participate portfolio firms’ operating activities (e.g., Sahlman (1990); Fulghieri and Sevilir (2009)), discredited VCs may not be able to add enough values to help investee firms to grow well in post-IPO periods. For example, they may make the wrong decisions when making investment decisions, which result in financial distress for the firm. Thus, our third hypothesis is:

H 3: VCs who failed to prevent IPO fraud cannot add sufficient values to IPO firms, resulting in inferior post-offering performance (e.g., operating performance, BHAR, IPO failure)

4.4 Data and Methodology

4.4.1 research design: identify discredited VCs

The key point in our study is to investigate the impact of the participation of VCs who failed to prevent their supported firms from being sued in the past on the performance of their future backed IPOs. Thus, it is important to identify the newly listed firms with discredited VCs.

To begin with, we have to control for the timing of the litigation event relating to VC's monitoring function. In general, VCs do not cash out immediately after the firm finished initial public offering. On the contrary, they stay and continue to provide value adding service in the portfolio firms through their expertise (e.g., sitting on the board) (e.g., Hellmann and Puri (2002)). Paul Gompers and Lerner (1998) find that VCs cash out about 70% of their investment at the end of the second year after the IPO. Thus, we define that VCs failed to monitor portfolio firms if the IPO litigation was committed within two years after going public. This approach is similar to that of Tian, Udell and Yu (2016).

4.4.2 The VC-backed IPO sample

Our data sample covers Initial Public Offerings from 1993 to 2015 in the US market. Following previous literature, we apply restrictions on the IPOs and exclude the firms with a share price below $5 when offering to the market, American depositary receipts (ADRs), closed-end funds, real investment trusts (REITs) and unit offerings. The data is downloaded from Thomson One along with other offering information, such as underwriter's name and the number of bookrunners at the time of IPO. This leaves us with 5963 IPO samples.

We then obtain VC-backed IPOs from VentureXpert database during the same period. We require that each IPO has full detailed venture capital investment information, including the name of VC firms. Finally, we match the samples with the IPO data from Thomson One by the offering information. We further eliminate the number of IPOs that are classified as VC-backed in Thomson One but cannot be found in VentureXpert. However, we notice that there are 44 IPO firms received their first investment from VCs in the post-IPO period. We exclude those observations since the study aims to focus on the impact of discredited VCs in pre-IPO periods on the corporate performance around or after the offering.

Further, there are 2742 undisclosed VC firms in our sample from VentureXpert database, which cause difficulty in recognizing their names and distinguishing each investment in our sample. Therefore, we do not include those VCs in our analysis. Our final sample consists of 1658 VC-backed IPOs between 1993 and 2015.

4.4.3 IPO litigation data

Our sued IPO data is from Stanford's Securities Class Action Clearinghouse (SCAC). We search SCAC for all recorded sued public companies with case filings between 1996 and 2015. There are 4313 total lawsuits from the database and 1016 litigations can be matched with our initial IPO samples. We then read each law action and identify whether the case was filed against the company's initial public offering misbehaviours (e.g., share allocation wrongdoings, accounting fraud), which leaves us with 539 IPO related litigations. Because the average time to detect the fraud is two years (Tracy Yue Wang, 2011), the litigation case in our sample was committed from 1993. Finally, we obtain 164 VC-backed newly listed firm which was committed to IPO litigation between 1993 and 2015.

Since we have obtained each VC firm's name for all VC-backed IPOs in our sample, we match VC firms which committed to IPO litigations with their supported IPOs in the years after the fraud was discovered. Thus, we construct a dummy variable *DVC* taking the value of one if an IPO firm has any discredited VC invested, otherwise is zero. To better understand this approach, suppose there is a VC syndicate consisting of three independent VC firms in an investee which conducted an IPO in 2000, and the IPO was found to commit to the accounting fraud in one year after going public. In the years after 2001, any of those three VCs backed IPOs will be deemed as firms with discredited VCs.

Finally, our sample of 1658 observations consists of 691 IPO firms with discredited VCs and 967 IPO firms without any discredited VCs.

4.4.4 Descriptive statistics

Table 1 reports VC-backed IPOs that were committed to law cases by the calendar year between 1993 and 2015. We observe that IPOs were found to be fraudulent reach the most around the bubble period. Specifically, there are 27 firms that went public in 1999 were litigated out of 170 backed IPOs in the cohort year. However, the number of sued IPOs are increased to 35 out of 169 total firms in 2000.

Table 2 shows the descriptive statistics of control variables we used in our analysis, as well as our variable of interests (e.g., DVC). On average, discredited VC-backed firms have 2.63 VCs who experience monitoring failures in the past, which accounts for 36.2% of whole VC syndicate. The average age for IPO firms is 11.011 years, with a mean total proceed of $ 101.261 million. The average total assets (sales) for our sample is $ 284.278 ($181.14) millions. 40.3% of issuers have hired top underwriters, and 77.3% of firms have used big-4 auditing firms in our sample. On average, insiders retained 6.377% of shares during the process of going public (*Overhang*). The average number of bookrunners in IPO firms is 1.458. 40% of firms operate in high-tech industries, and 20.7% of firms went public during the bubble period. The mean leverage ratio for issuers is 0.33. Finally, IPO firms show average profitability of -0.089 when going public. Nevertheless, this is consistent with Jain, Jayaraman and Kini (2008) which argue that firms decide to go public even if they do not make a positive profit.

IPO firms backed by discredited VCs are younger than their counterparts that are without any discredited VCs (10.635 years vs 11.280 years). Moreover, issuers with VCs who failed to monitor previous investments tend to raise more proceeds during the IPO than issuers without any discredited VCs invested in the firm. Also, discredited VCs more likely to invest in IPO firms with higher total assets and sales than normal VCs ($314.977 million vs $261.737 million; $229.91 million vs $146.344 million, respectively). Discredited VC-backed IPO firms are more likely to hire reputable underwriters and big-4 auditors (50.1% vs 88.1%) than IPO firms without any discredited VCs (33.3% vs 69.6%). Moreover, insiders in firms with discredited VCs tend to retain more shares than in firms without any discredited VCs (6.756 vs 6.106). Firms with VCs who had backed litigated IPOs have more bookrunners than firms without any such VCs (1.88 vs 1.156). Discredited VCs are less likely to invest in high-tech firms compared to typical VCs (48.8% vs 49.2%). IPO firms with the participation of discredited VCs are less likely to go public in bubble period than their counterparts without investment from the discredited VCs (20.1% vs 21.1%). The average leverage ratio for discredited VC backed IPO firms is lower than firms without discredited VCs (0.321 vs 0.336). Finally, we find that IPO firms with discredited VC invested are less profitable than IPO firms without any discredited VCs (-0.132 vs -0.059).

Table 3 shows the descriptive statistics for the measures of IPO performance. Firstly, we observe an average IPO underpricing of 27.96% for all sample firms, with a mean revision of 0.851%. Further, regarding the growth of operating return on assets in post-offering years, we find a steady positive growth rate from IPO year to three years after the IPO. In Panel C, investors earn positive buy and holder abnormal returns in different periods, except in month 4 to month 6 after the offering. The average delisting rate for the full sample of VC-backed IPO firms is 26.2%.

A majority of IPO performance measure display significant differences between discredited and non-discredited VC-backed firms. Specifically, we observe that the average IPO underpricing is higher for firms with discredited VCs than firms without discredited VCs (33.271% vs 24.164%), and the mean difference is statistically significant at the 1% level. This suggests a pattern that discredited VCs potentially raise less capital than they could be, because of more “money left on the table”. The average offer price revision for discredited VC-backed IPO firms is also higher than non-discredited VC backed firms (0.901% vs 0.815%). In addition, we newly listed firms with discredited VCs experience negative growth of operating return on assets in post-offering years; while firms without discredited VCs exhibit positive growth rates. Further, the buy and hold abnormal returns for investors in discredited VC-backed IPO firms are generally lower than in non-discredited VC-backed IPO firms across different holding periods. For instance, at the end of month 6 after the offering, the BHARs for the investor in discredited VC backed IPO firms is -0.015, which is significantly lower than 0.043 in IPO firms without any discredited VCs. Finally, we find a significantly higher delisting rate for newly listed firms with discredited VCs than those who do not have any (29.8% vs 18.6%).

Overall, our univariate analysis has suggested that discredited VC-backed IPO firms underperform their counterparts that are without any discredited VCs. In the next section, we use multivariate analysis to examine the impact of discredited VCs on IPO performance.

4.5 Empirical results

4.5.1 IPO underpricing

We first estimate the effect of having discredited VCs in a newly listed firm on IPO underpricing. We use the ordinary least squares regressions and include a rich set of control variables that have been found to have an impact on underpricing. We further control for an unobservable different year and industry effects by incorporating year and industry dummies in all regression analyses. The results are displayed in Table 4.

In specification (1), we only include the variable of interest *DVC* which indicates whether the IPO firm is supported by VCs who had backed fraudulent IPOs in the past or not. We only control for year effect in this model. As seen, the coefficient on *DVC* is positive and highly significant at the 1% level, which provides initial evidence that IPO firms backed by discredited VCs incur greater underpricing, and thus "left money on the table" during the process of going public. In specification (2), we incorporate other control variables. As expected, the sign on *DVC* is still positive and statistically significant at the 1% level. We use *DVC(%)* as the variable of interest in the specification (3). The variable is measured as the ratio of discredited VCs to all VCs in an investment syndicate in the IPO firm. We continue to find a positive and significant coefficient on *DVC(%)* in the specification (3). Taking specification (2) as an example, on average, newly listed firms with discredited VCs experience a US $16.3 million potential loss compared to their counterparts without any discredited VCs participated.

Majority of control variables show expected signs and statistically significant at the conventional levels, which are generally in line with previous literature. Specifically, a firm with longer operating history reduces information asymmetry and uncertainty, because information for those firms tends to be richer than young firms (e.g., reputation) (e.g., Nielsson and Wójcik (2016)). We find a positive association between IPO proceeds and underpricing as per Gounopoulos et al. (2017). Large firms proxied by total assets also contribute to the reduction of information asymmetry, and therefore reduce IPO underpricing. The sign on *Ln (total assets)* is negative and significant at the 1% level, which supports the finding in Suman Banerjee, Dai and Shrestha (2011). Gounopoulos et al. (2017) report a negative association between the level of firm leverage and underpricing because firms rely more on debt financing release a positive signal and therefore lowers asymmetric information in the market. Thus, our finding is also aligned with their argument.

Moreover, we report a positive relationship between the top-tier underwriter and IPO underpricing, which is a contrast to Carter, Dark and Singh (1998) and Megginson and Weiss (1991), though it support findings from most recent studies, such as Loughran and Ritter (2004) and Marcato, Milcheva and Zheng (2018). The sign on *Share overhang* is consistent with Bradley and Jordan (2002) that greater insider holdings implies lower dilution costs and cause greater underpricing. In addition, we report a positive coefficient on *Ln(no of bookrunners)*, which support the argument that more bookrunners indicate more effort made during the IPO (e.g., Suman Banerjee, Dai and Shrestha (2011)). Finally, we do not find evidence between big-4 auditing firms and IPO underpricing.

Overall, the results so far are consistent with our prediction that discredited VCs enlarge information asymmetry in the pre-IPO period, and therefore increase IPO underpricing. Nevertheless, we attempt to provide a more meaningful interpretation of the relation between the participation of discredited VCs and IPO underpricing by conditioning the discredited VC effect on the severity of the information asymmetry issue. Particularly, we adopt two measures to characterize the extent of information asymmetry problem in the firms: firm age and total assets. Previous studies have recognized that young and small firms are usually characterized by high information asymmetry between insiders and outsiders (e.g., firms and investors) (e.g., Wei Wang and Yung (2011); Garrett, Hoitash and Prawitt (2014); Pevzner, Xie and Xin (2015); Li, Wang and Wang (2019)). Inexperienced firms with discredited VCs or small-sized firms are expected to face greater information asymmetry, holding other factors constant. In other words, those two firm characteristics are expected to amplify the effect of information asymmetry in the presence of discredited VCs. Thus, if our proposed explanation of damaged reputation of VCs with fraudulent IPOs backed in the past enlarges information asymmetry in newly listed firms holds, we should find a larger effect of discredited VCs in young and small firms on IPO underpricing. If we do not find such evidence, then our explanation of discredited VCs on IPO underpricing may be driven by the asymmetric information. We present the results in Table 5.

First of all, in the specification (1), we use an interaction term between *DVC* and *Ln(total assets)*, the coefficient is negative and significant at the conventional level. In specification (2), we observe that the coefficient on *DVC*Firm age* is also negative and statistically significant at the 5% level. Importantly, the variable of interest *DVC* displays consistent positive signs and are highly significant (at 1%), suggesting that information asymmetry proxied by firm age and size have an impact on IPO underpricing in firms with the participation of discredited VCs. Indeed, all else equal, newly listed firms with high information asymmetry issue are expected to increase IPO underpricing, particular if the firm is supported by VCs whose backed IPOs were litigated in the past, as the litigation experience significantly decreases VC's reputation which affects investor's confidence about the new issue. Moreover, we find similar evidence in specifications (3) and (4), where we interact *DVC(%)* with *Ln(total assets)* and *Firm age* separately.

In this section, the evidence suggests that reputation damaged VCs enlarges information asymmetry in their supported firms when going public, in turn, resulting in higher IPO underpricing. As a result, issuers raise less capital as they potentially could do as more excessive money "left on the table". The results support our first hypothesis.

4.5.2 Offer price revision

In this section, we test how the participation of discredited VCs affect IPO offer price revision. We measure revision as the percentage change from the midpoint of the filing price range to the final offer price of the new share (e.g., Loughran and McDonald (2013)). We incorporate the same set of control variables from Table 4 as those controls are also found to have an impact on the revision (e.g., Loughran and McDonald (2013); Cooney et al. (2015); Gounopoulos et al. (2017)). We also control for year and industry fix effects in the analysis. The results are presented in Table 6.

In specification (1), the coefficient on the variable *DVC* is positive and significant at the 1% level, suggesting a positive relation between discredited VCs and offer price revision. We find similar results in the specification (2), where we use *DVC(%)* as the variable of interest. Therefore, the results are consistent with our second hypothesis that greater information asymmetry caused by the discredited VCs drives underwriter to frequently revise the offer price to induce private information from investors. The result also supports the argument that IPOs with substantial uncertainty, on average, generate lower preliminary offer prices and greater IPO underpricing, as well as higher revisions, because underwriters need to compensate investors for the information exchange (e.g., Loughran and McDonald (2013)).

Overall, the results in this section are consistent with our hypothesis that there is a high demand of information collection in the presence of discredited VC-backed IPO firms, resulting in greater number of up revisions from underwriters.

4.5.3 Post-IPO performance

Apart from our hypothesis that VCs who have backed fraudulent IPOs in the experience declines in reputation, we should also question discredited VC's managerial ability in investee firms. Our promise is that the litigation faced by IPO firms that VCs backed may not be an accidental event. On the contrary, it might be due to the insufficient managerial capacity of VCs. If this is true, then we should expect that IPO firms backed by discredited VCs experience declined corporate performance in the post-offering period. In this section, we explore this effect from different aspects of corporate performance, including post-IPO operating performance, buy and hold abnormal returns (BHAR), and IPO failure risk.

4.5.3.1 Operating return on assets

We now explore the relationship between the participation of discredited VCs in an IPO firm and its post-IPO operating performance. Our measure of operating performance is the operating return on assets, which is the operating income before depreciation scaled by total assets (e.g., Jain and Kini (1994); Espenlaub et al. (2016)). The measure represents a firm's ability to make profits from the investments they made. A high value indicates that firms can receive greater returns from fewer investments.

We use an industry comparable matched firm approach to calculate the operating return on assets for our sample (e.g., Purnanandam and Swaminathan (2004)). We first draw all firms with ordinary common shares with financial information from Compustat between 1993 and 2015. We exclude special instruments, such as REITs, closed-end funds, ADRs. We then match our sample with the matching firm based on the size decile in the year that proceeds the IPO at the 3-digit SIC level. Nevertheless, we restrict the firms that did not go public in the past three years and have the stock price more than $ 5 in the year that the sample firm conduct the IPO. Thus, a firm's post-IPO operating performance is measured as the change of the firm's operating return on assets from IPO year to year *y* in the post-offering period minus the corresponding change of matching firm. We use a set of controls as previous literature suggests an impact on post-IPO financial performance (e.g., Shantanu Banerjee, Güçbilmez and Pawlina (2016); Boulton and Campbell (2016)). Due to financial information available in the database, firm's listing status (e.g., M&A), and matching firm restriction, the number of observations in our sample vary from year one after listing to year three after listing. The results are presented in Table 7.

First of all, firms with discredited VCs backed exhibit negative growth rate of operating return on assets in one year after listing compared to firms without the participation of discrete VCs, as the coefficient on *DVC* is -2.280 and statically significant at the 10% level. However, we observe that the difference is getting larger over the second and third post-IPO year. Specifically, by the end of the second year after listing, we see a negative coefficient on *DVC* with a larger magnitude (e.g., -5.677) with a high significance of 1%. By the end of year 3, the coefficient is -6.442 and significant at the 5% level. Thus, we conclude that the post-offering operating performance of discredited

VC-backed IPO firms significantly underperforms non-discredited VC-backed counterparts, which is attributed to discredited VCs' defective managerial abilities.

4.5.3.2 Buy and hold abnormal returns (BHAR)

In this section, we particularly explore discredited VC-backed IPO firm's buy and hold abnormal returns (BHAR) in the post-offering period. Using BHAR is an appropriate measure for an IPO's performance as it captures an investor's stock returns over a period of time. We calculate the BHAR as the following:

$$BHAR(t_1, t_2) = \prod_{t=t_1}^{t_2}(1 + R_{it}) - \prod_{t=t_1}^{t_2}(1 + R_{bt})$$

Where R_{it} is the daily return of IPO firm *i* on date *t*; R_{bt} is the corresponding return for the benchmark on the same date. Our benchmark is measured as the value weighted market index. The stock price is obtained from the Centre for Research in Security prices (CRSP) database. The stock holding period for an investor begins from date t_1 which represents the first day after the IPO and end at date t_2. We measure BHAR for five different time windows after the offering, which are week 1, week 2 to week 4, month 2 to month 3, month 4 to month 6, and from the date after listing until the end of the 6th month. We incorporate the same set of control variables from Table 7. The results of estimating the effect of discredited VCs on IPO firm's BHARs are presented in Table 9.

The coefficients on the variable of interest *DVC* displays consistently negative coefficients and statistically significant at the conventional level, except in specification (3), where the BHAR is measured between month 2 and month 3. The results imply that IPO firms supported with discredited VCs experience lower market-adjusted returns over different time windows after the offering. The control variables only partially show statistical significance in some specifications. Firm age appears to have a negative impact on the long-run abnormal returns in the specification (5). Consistent with previous studies (e.g., Carter, Dark and Singh (1998); Ritter (2011); Cao, Jiang and Ritter (2013)), we find larger firms (proxied by total assets) exhibit significantly better stock performance; while firms with greater underpricing and revisions experience declined abnormal returns.

Overall, the above evidence also corresponds to the results in Table 7, which shows a negative relationship between discredited VCs and post-IPO operating performance.

4.5.3.3 IPO failure risks

Several studies have revealed that the participation of VCs in IPO firms adds values during the process of going public (e.g., Barry et al. (1990); Megginson and Weiss (1991) Hellmann and Puri (2002)). In this regard, Jain and Kini (2000) document that VC-backed firms significantly reduce failure risks for newly listed firms in the post-offering period. However, our results from previous sections suggest that discredited VCs do not necessarily add values to IPOs, as their backed firms experience negative operating growth and buy-and-hold abnormal returns in the periods subsequent to the offering. Therefore, in this section, we question whether the participation of discredited VCs implies future delisting risks.

We first need to identify IPO's listing status for each of our sample firms. Because we need to leave at least five years for tracking each IPO's status, we reduce our sample period from 2015 to 2010. Thus, each IPO firm is tracked from the offering year to the end of 2015. We then obtain the firm's status code from CRSP. Following previous studies, such as Gounopoulos and Pham (2018), we categorize failed firms as those were delisted due to any negative reasons (e.g., bankruptcy, liquidation). Thus, failed firms are assigned with the CRSP code equal to or above 300. We identify firms as survived if the firm is continuing to trade at the end of tracking period (e.g., end of 2015) (CRSP-code is 100) or it was either merged or acquired (CRSP-code between 200 and 299).

To evaluate the impact of discredited VCs on post-IPO failures, we employ the Cox proportional-hazard model. The COX model is a wildly adopted approach to analyze firm failure risks (e.g., Jain and Kini (2008); Espenlaub, Khurshed and Mohamed (2012); Gounopoulos and Pham (2018); Helbing, Lucey and Vigne (2019)). Compared to other approaches (e.g., logistic regression, which only predicts the occurrence of an event), the COX model takes consideration of time factors before the event date, as well as censored units. The data is deemed as censored if the event has not yet been conducted during the tracking periods. In this case, the observations in our sample are right censored because many IPO firms do not encounter failure by the end of the tracking period (e.g., 31 December 2015). Further advantages of using COX model is that it does not require pre-determined hazard function and can take any functioning form (e.g., see, Allison (2010)). We estimate the COX model as follows:

$$h(t) = h_0(t)\exp\,[\beta_1 DVC + \sum \beta_i Control\ variables + Year\ fix\ effect + Industry\ fix\ effect]$$

Where $h_0(t)$ is the hazard function, and the left side of the equation is the hazard ratio regarding the IPO firm delisting risks. A positive (negative) coefficient suggests a higher (lower) IPO delisting risk. The hazard ratio is calculated as an exponentiated coefficient. For binary variables, the hazard ratio indicates the ratio of the hazard for those with value one to that of those with value zero. An IPO firm is more (less) likely to be delisted if the hazard ratio is greater (less) than one. We include control variables that are related to the probability of newly listed firm failures in our regression models. The results are presented in Table 9.

In specification (1), we classify failed firms as those are delisted due to any negative reasons. The coefficient on the variables of interest *DVC* is 0.293 and statistically significant at the 10% level, suggesting that discredited VC backed IPO firms are more likely to experience failures in the periods subsequent to the offering. A hazard ratio of 1.341 indicates that IPO firms with discredited VCs invested makes it 1.431 times more likely that such firms will fail compared to firms without discredited VCs. Moreover, because Welbourne and Andrews (1996) document that merges and acquisitions result in decreased stock prices, which lead to financial distress for acquired firms. Therefore, we further identify failed IPO firms by including those who are delisted due to M&As (e.g., CRSP delisting code between 200 and 299). In specification (2), the coefficient on *DVC* is also positive and statistically significant, suggesting a higher failure risks for discredited VC backed IPO firms.

Regarding control variables, *Underpricing* appears to be negatively associated with IPO failures, which is consistent with the finding from Demers and Joos (2007). Consistent with the argument that the reputation stake of financial intermediaries plays a certification role in going public, thereby adding value to the firm, we find a significant and negative coefficient on *Underwriter*. However, we do not reveal such evidence on *Auditor*. Moreover, firms in high-tech industries are more like to be delisted in post-IPO periods, which is aligned with the view that those firms are usually young and risky (e.g., Alexander Ljungqvist and Wilhelm (2003)). Moreover, the coefficient on *Ln(sales)* is negative and significant at the 1% level, suggesting that IPO firms with larger size are less like to fail. The evidence is consistent with Espenlaub et al. (2016). Finally, firms with higher *Leverage* ratio are positively related to post-IPO failures, as per Gounopoulos and Pham (2018).

To conclude, we find evidence which is consistent with our previous findings. In particular, the participation of discredited VCs does not add sufficient values to newly listed firms, which results in IPO failures in the future.

4.6 Discussion: why discredited VCs tolerate higher IPO underpricing?

So far, we have revealed that discredited VC-backed experience high IPO underpricing, thereby leaving more "money on the table". Although this is consistent with our first hypothesis that reputation damaged VCs increases information asymmetry, it is not clear why discredited VC would tolerate such a high underpricing. Paul A Gompers (1996) and Lee and Wahal (2004) argue that younger VCs bring firms to go public earlier than older VCs in order to build some reputation, resulting in high underpricing. Liu and Ritter (2011) find that VCs do not care high underpricing because they focus on the all-star analyst coverage when shares are allocated to limited partners. Given that high underpricing can work as an efficient tool to lower litigation risks (e.g., Lowry and Shu (2002)), in this section, we particular examine whether high IPO underpricing can help discredited VC-backed IPOs reduce further litigations. Our promise is that, if VCs had failed to prevent IPO fraud, then they may make the same mistake in the future. In this case, investors may be less likely to sue IPO firms if they have received enough compensation. We present our results using logistic models in Table 10.

In specification (1), we only include variable *DVC.* The coefficient is 0.619 and significant at the 1% level, suggesting that IPO firms with discredited VCs experience a higher likelihood of being litigated within two years after the offering. Previous studies suggest that firms using higher underpricing as a hedge of IPO litigation (e.g., Lowry and Shu (2002)). Thus, we add variable *Underpricing* in the specification (2). However, we find that firms with higher underpricing face greater litigation risks in post-IPO periods, which supports the finding of Zhu (2009) that IPO underpricing may not act as efficient insurance channel to against litigations (e.g., see, Walker et al. (2015)). In specification (3), we incorporate a set of control variables that are related to IPO firm uncertainties. Particularly, we find that long-lived firms are less likely to face litigations; while a firm with more assets and operating in high-tech industries are more likely to be sued. The evidence is consistent with findings from previous studies (e.g., Lowry and Shu (2002); Hanley and Hoberg (2012)). In specification (4), we add two variables related to financial intermediaries, *Underwriter* and *Auditor*. Surprisingly, we find a positive relationship between the quality of underwriters and post-IPO litigation risks for VC-backed firms. This finding is on the contrary to previous studies which arguing that underwriters certify the issuing firm, thereby lowering the likelihood of being sued for the IPO. We do not report any evidence of the effect of top-4 auditors on IPO litigations.

In specification (4), we introduce an interaction term between *DVC* and *Underpricing*. The resulting coefficient is -0.008 and highly significant at the 1% level, suggesting that greater IPO underpricing can help discredited VC-backed firms avoid post-offering litigations. Hanley and Hoberg (2012) document that underwriters partially adjust revisions because they are motivated to minimize IPO litigation risks. Under this circumstance, we hypothesize that because of the past monitoring failures of discredited VCs, underwriters have more incentive to use higher revisions to avoid future IPO litigations. Nevertheless, underwriters may choose not to fully revise the offer price because of the need for positive information from investors (e.g., see, Loughran and McDonald (2013)). Indeed, since discredited VCs increase information asymmetry and reduce investor’s confidence, underwriters need to carefully consider the level of offer price revision, in order to reach a balance between issuers and investors. Finally, investors are less likely to sue discredited VC-backed IPO firms if they have received enough compensation (e.g., greater underpricing).

Overall, in this section, the results are consistent with our previous argument that VCs who failed to prevent litigations in the past indicate an insufficient managerial ability, as their future supported firms are also experiencing the high likelihood of being sued.

4.7 Conclusion

In this study, we investigate the performance of discredited VC-backed IPO firms. We use IPO litigation for VC-backed firms and define discredited VCs as whose backed IPOs were involved in the lawsuits within two years after the offering. We find that reputation and managerial ability concerns matter for those VCs.

First, we reveal that discredited VC-backed IPOs are associated with greater IPO underpricing. This finding is aligned with the fundamental argument that information asymmetry leads to high underpricing and result in potential losses for issuers, which indicates that reputation damaged VCs enlarge information asymmetry around the initial public offering. We further reveal that there is a greater number of upper offer price revisions in discredited VC backed IPOs, confirming that a higher information asymmetry around those issues and underwriters take advantage of revising the offer price to induce private information from investors.

Furthermore, we also find evidence of the inferior post-IPO performance of discredited VC-backed IPO firms, which implies that discredited VCs do not necessarily add values to IPO firms because of the reduced managerial ability. Specifically, IPO firms with discredited VCs experience declined operating return on assets and BHARs compared to their non-discredited VC-backed counterparts. Moreover, evidence shows that discredited VC-backed firms are more likely to fail in post-IPO periods. Finally, we find that those discredited VC-backed IPOs are associated with a higher likelihood of being sued again; but this effect can be mitigated along with greater underpricing, suggesting an issuance channel of the use of underpricing to avoid litigations.

To conclude, our study provides new evidence on how reputation damaged VCs affect the performance of IPO firms. This may challenge the previous argument that VCs are value adding intermediaries and bring further attention to investors when evaluating the new issues with VCs who failed to monitor and result in IPO lawsuits in their backed portfolio firms.

Table 1 Distribution of IPO litigations

The table displays the distribution of the committed IPO frauds from 1993 to 2015. Our IPO litigation data is from Stanford's Securities Class Action Clearinghouse (SCAC).

IPO year	No. of IPO litigations	Total
1993	2	121
1994	6	82
1995	2	126
1996	5	179
1997	3	90
1998	5	56
1999	27	170
2000	35	169
2001	5	28
2002	8	23
2003	9	18
2004	4	53
2005	13	43
2006	5	55
2007	7	75
2008	2	7
2009	2	11
2010	3	40
2011	5	40
2012	4	44
2013	5	71
2014	3	97
2015	4	60
Total	164	1,658

Table 2 Descriptive statistics for control variables

The table displays descriptive statistics of control variables used in the analysis. We define discredited VC-backed IPO as if the new issuing firms have any VCs who failed to prevent IPO fraud and lead to post-offering litigations in the past. *No of DVC* is the number if discredited VCs in the IPO firm. *DVC(%)* is the percentage of discredited VCs in the total VC syndicate. All variables are defined in the appendix.

	Full sample						IPOs without discredited VCs		IPOs with discredited VC		Diff. in means(p-value)
	N	Mean	p25	p50	p75	sd	N	Mean	N	Mean	
No of DVC	-	-	-	-	-	-	-	-	691	2.63	-
DVC(%)	-	-	-	-	-	-	-	-	691	0.362	-
Firm age	1658	11.011	5.000	8.000	12.000	11.687	967	11.280	691	10.635	0.170
Proceeds	1658	101.261	33.000	55.000	94.500	425.696	967	73.764	691	139.741	0.001
Total assets	1658	284.278	45.779	91.353	183.441	1207.335	967	261.737	691	314.977	0.808
Underwriter	1658	0.403	0.000	0.000	1.000	0.491	967	0.333	691	0.501	0.000
Auditor	1658	0.773	1.000	1.000	1.000	0.419	967	0.696	691	0.881	0.000
Overhang	1658	6.377	2.100	3.023	4.750	19.459	967	6.106	691	6.756	0.251
No of bookrunners	1658	1.458	1.000	1.000	2.000	1.008	967	1.156	691	1.880	0.000
High tech	1658	0.490	0.000	0.000	1.000	0.500	967	0.492	691	0.488	0.428
Bubble period	1658	0.207	0.000	0.000	0.000	0.405	967	0.211	691	0.201	0.314
Sale	1650	181.14	10.172	37.339	103.048	721.232	963	146.344	687	229.91	0.010
Leverage	1658	0.330	0.129	0.232	0.432	0.431	967	0.336	691	0.321	0.761
Profitability	1644	-0.089	-0.241	-0.017	0.115	0.344	959	-0.059	685	-0.132	0.000

Table 3 Descriptive statistics for IPO performance measures

The table displays descriptive statistics of IPO performance measures. Panel A includes IPO short-run performance measures, such as IPO underpricing and offers price revision. Panels B, C, and D include short-run performance measures, such as operating return on assets, buy and hold abnormal returns (BHARs), and post-offering failure risks. All variables are defined in the appendix.

	Full sample						IPOs without discredited VCs		IPOs with discredited VC		Diff. in means(p-value)
	N	Mean	p25	p50	p75	sd	N	Mean	N	Mean	
Panel A											
Underpricing	1658	27.960	0.000	10.00	33.33	54.337	967	24.164	691	33.271	0.000
Revision	1658	0.851	-9.09	0.000	11.11	19.200	967	0.815	691	0.901	0.464
Panel B: Operating return on assets											
Operating ROA Year1	1362	0.528	-0.573	0.165	1.117	35.227	802	1.401	560	-0.723	0.137
Operating ROA Year2	1139	1.582	-0.880	0.111	1.383	53.714	681	2.996	458	-0.521	0.139
Operating ROA Year3	945	1.878	-0.882	0.064	1.423	54.659	559	4.446	386	-1.840	0.041
Panel C: Buy and hold abnormal returns											
BHAR[week 1]	1572	0.002	-0.063	-0.009	0.046	0.143	920	0.006	652	-0.005	0.052
BHAR[week 2-4]	1572	0.039	-0.081	0.006	0.119	0.247	920	0.042	652	0.035	0.304
BHAR[month 2-3]	1572	0.016	-0.201	-0.027	0.155	0.398	920	0.009	652	0.027	0.189
BHAR[month 4-6]	1572	-0.055	-0.292	-0.107	0.108	0.411	920	-0.038	652	-0.079	0.025
BHAR[month 0-6]	1572	0.019	-0.419	-0.123	0.217	0.811	920	0.043	652	-0.015	0.080
Panel D: Failure risks											
IPO delisting	1278	0.262	0	0	1	0.439	866	0.186	412	0.298	0.000

Table 4 The impact of discredited VCs on IPO underpricing

The table display results using ordinary least square regressions to investigate the impact of the participation of discredited VCs in IPO firms on underpricing. The dependent variable is IPO underpricing, which is measured as the percentage change from the share price of the first day of trading to the offer price. We define discredited VC-backed IPO as if the new issuing firms have any VCs who failed to prevent IPO fraud and lead to post-offering litigations in the past. *No of DVC* is the number if discredited VCs in the IPO firm. *DVC(%)* is the percentage of discredited VCs in the total VC syndicate. All variables are defined in the appendix. All regressions include year and industry controls. One, two and three asterisks denote statistical significance at the 10%, 5% and 1% level. The t-statistics are included in the parentheses and are reported for heteroscedasticity robust standard errors. All variables are defined in Appendix A.

	(1)	(2)	(3)
DVC	19.274***	16.097***	
	(4.27)	(3.63)	
%of DVC in IPO			8.672*
			(1.73)
Firm age		-1.510	-2.041
		(-0.99)	(-1.30)
Ln (proceeds)		17.776***	17.618***
		(6.70)	(6.60)
Ln(total assets)		-5.795***	-5.702***
		(-3.94)	(-3.86)
Leverage		-6.032**	-6.828**
		(-2.07)	(-2.36)
Underwriter		7.936***	8.769***
		(2.98)	(3.25)
Auditor		1.404	2.251
		(0.44)	(0.70)
Share overhang		0.226*	0.240**
		(1.93)	(2.00)
Ln (no of bookrunners)		-8.956**	-9.523**
		(-2.28)	(-2.42)
Intercept	6.902	-36.311***	-37.930***
	(1.15)	(-3.70)	(-3.82)
R-squared	0.2303	0.2818	0.2721
Obs	1658	1658	1658

Table 5 The impact of discredited VCs on IPO underpricing with interactive effects

The table display results using ordinary least square regressions to investigate the interactive effects of the participation of discredited VCs in IPO firms with other factors on underpricing. The dependent variable is IPO underpricing, which is measured as the percentage change from the share price of the first day of trading to the offer price. We define discredited VC-backed IPO as if the new issuing firms have any VCs who failed to prevent IPO fraud and lead to post-offering litigations in the past. Thus, DVC is a dummy taking the value of one if the IPO firms have any discredited VCs, otherwise is zero. *DVC(%)* is the percentage of discredited VCs in the total VC syndicate. All variables are defined in the appendix. All regressions include year and industry controls. One, two and three asterisks denote statistical significance at the 10%, 5% and 1% level. The t-statistics are included in the parentheses and are reported for heteroscedasticity robust standard errors. All variables are defined in Appendix A.

	(1)	(2)	(3)	(4)
DVC	24.769***	35.443***		
	(2.78)	(3.10)		
DVC*Ln(total assets)	-2.700*			
	(-1.66)			
DVC* Firm age		-9.221**		
		(-2.34)		
DVC(%)			31.076**	40.086**
			(2.18)	(2.51)
DVC(%)*Ln(total assets)			-4.971**	
			(-2.03)	
DVC(%)*Firm age				-12.336**
				(-2.42)
Firm age	-2.143	1.195	-2.028	-0.541
	(-1.41)	(0.75)	(-1.30)	(-0.34)
Ln(proceeds)	17.399***	17.547***	17.707***	17.623***
	(6.63)	(6.73)	(6.64)	(6.60)
Ln(total assets)	-4.540***	-5.808***	-5.091***	-5.703***
	(-2.99)	(-3.97)	(-3.34)	(-3.88)
Leverage	-5.775**	-6.076**	-6.803**	-6.699**
	(-2.01)	(-2.10)	(-2.28)	(-2.31)
Underwriter	8.010***	7.644***	8.571***	8.533***
	(3.09)	(2.87)	(3.19)	(3.17)
Auditor	0.688	1.257	2.129	2.027
	(0.22)	(0.39)	(0.66)	(0.63)
Share overhang	0.223**	0.228**	0.242**	0.244**
	(1.97)	(1.99)	(2.03)	(2.05)
Ln(no of bookrunners)	-7.959*	-7.969**	-7.370*	-8.780**
	(-1.87)	(-2.00)	(-1.77)	(-2.19)
Intercept	-26.107***	-43.705***	-40.285***	-42.349***
	(-2.72)	(-4.19)	(-4.01)	(-4.13)
R-squared	0.2902	0.2851	0.2733	0.2738
Obs.	1658	1658	1658	1658

Table 6 The impact of discredited VCs on offer price revisions

The table display results using ordinary least square regressions to investigate the impact of the participation of discredited VCs in IPO firms on offer price revisions. The dependent variable is a revision, which is measured as the percentage change from the offer price to the mid of filing price range. We define discredited VC-backed IPO as if the new issuing firms have any VCs who failed to prevent IPO fraud and lead to post-offering litigations in the past. Thus, DVC is a dummy taking the value of one if the IPO firms have any discredited VCs, otherwise is zero. *DVC(%)* is the percentage of discredited VCs in the total VC syndicate. All variables are defined in the appendix. All regressions include year and industry controls. One, two and three asterisks denote statistical significance at the 10%, 5% and 1% level. The t-statistics are included in the parentheses and are reported for heteroscedasticity robust standard errors. All variables are defined in Appendix A.

	(1)	(2)
DVC	3.624***	
	(3.13)	
DVC(%)		4.113**
		(2.10)
Firm age	-0.083	-0.226
	(-0.13)	(-0.37)
Ln(proceeds)	13.739***	13.708***
	(15.25)	(15.28)
Ln(total assets)	-4.091***	-4.082***
	(-7.52)	(-7.47)
Leverage	-1.769	-1.950
	(-0.69)	(-0.76)
Underwriter	0.241	0.352
	(0.24)	(0.35)
Auditor	0.396	0.528
	(0.37)	(0.49)
Share overhang	-0.018	-0.016
	(-0.71)	(-0.59)
Ln(no of bookrunners)	-6.032***	-6.349***
	(-4.28)	(-4.45)
Intercept	-29.575***	-29.571***
	(-5.17)	(-5.15)
R-squared	0.2339	0.2311
Obs.	1658	1658

Table 7 The impact of discredited VCs on post-IPO operating return on assets

The table display results using ordinary least square regressions to investigate the impact of the participation of discredited VCs in IPO firms on operating return on assets in post-offering periods. The dependent variable is the percentage change of operating return on assets from year *y* to IPO year. We measure operating return on assets as the ratio of operating income to total assets. We define discredited VC-backed IPO as if the new issuing firms have any VCs who failed to prevent IPO fraud and lead to post-offering litigations in the past. Thus, DVC is a dummy taking the value of one if the IPO firms have any discredited VCs, otherwise is zero. All variables are defined in the appendix. All regressions include year and industry controls. One, two and three asterisks denote statistical significance at the 10%, 5% and 1% level. The t-statistics are included in the parentheses and are reported for heteroscedasticity robust standard errors. All variables are defined in Appendix A.

	(1)	(2)	(3)
	0-1	0-2	0-3
DVC	-2.280*	-5.677***	-6.442**
	(-1.90)	(-3.31)	(-2.39)
Firm age	0.488	-0.359	-0.155
	(0.42)	(-0.69)	(-0.05)
Ln(proceeds)	-0.366	-1.706*	0.567
	(-0.35)	(-2.08)	(0.31)
Ln(total assets)	-0.200	0.626	-0.661
	(-0.27)	(0.99)	(-0.43)
Underwriter	-0.565	-0.058	-1.829
	(-0.41)	(-0.10)	(-0.50)
High tech	4.457*	4.142***	1.944
	(1.73)	(3.62)	(0.37)
Bubble period	-1.320	5.257	10.256
	(-0.25)	(1.34)	(1.17)
Underpricing	-0.005	-0.031**	-0.021
	(-0.39)	(-2.66)	(-1.42)
Revision	-0.075	-0.010	0.033
	(-1.61)	(-0.33)	(0.36)
Intercept	10.915**	14.478**	12.610*
	(2.26)	(2.36)	(1.72)
R-squared	0.0164	0.0185	0.0252
Obs.	1362	1139	945

Table 8 The impact of discredited VCs on buy and hold abnormal returns

The table display results using ordinary least square regressions to investigate the impact of the participation of discredited VCs in IPO firms on buy and hold abnormal returns (BHARs). The dependent variable is BHAR in different periods after the offering. We define discredited VC-backed IPO as if the new issuing firms have any VCs who failed to prevent IPO fraud and lead to post-offering litigations in the past. Thus, DVC is a dummy taking the value of one if the IPO firms have any discredited VCs, otherwise is zero. All variables are defined in the appendix. All regressions include year and industry controls. One, two and three asterisks denote statistical significance at the 10%, 5% and 1% level. The t-statistics are included in the parentheses and are reported for heteroscedasticity robust standard errors. All variables are defined in Appendix A.

	(1)	(2)	(3)	(4)	(5)
	Week 1	Week 2-4	Month 2-3	Month 4-6	Month 0-6
DVC	-0.020**	-0.022*	-0.001	-0.048*	-0.071*
	(-2.09)	(-1.80)	(-0.06)	(-1.88)	(-1.77)
Firm age	-0.004	-0.004	-0.014	-0.007	-0.050*
	(-0.68)	(-1.42)	(-1.08)	(-0.48)	(-1.67)
Ln(proceeds)	-0.009	-0.012	-0.008	-0.010	-0.050
	(-1.46)	(-1.09)	(-0.40)	(-0.49)	(-1.41)
Ln(total assets)	0.006**	0.006**	-0.002	0.013	0.037
	(2.07)	(2.15)	(-0.14)	(1.01)	(1.58)
Underwriter	0.008	0.013**	0.052	0.018	0.080*
	(1.29)	(2.63)	(1.47)	(0.85)	(1.89)
High tech	-0.008	0.028**	-0.029	-0.039	-0.022
	(-1.16)	(2.63)	(-0.80)	(-1.16)	(-0.29)
Bubble period	-0.028	-0.030	-0.145	-0.214	-0.316
	(-0.49)	(-0.77)	(-0.98)	(-1.17)	(-1.53)
Underpricing	0.000	-0.000**	-0.000	0.000	-0.000
	(1.29)	(-2.33)	(-0.17)	(0.15)	(-0.35)
Revision	-0.000**	0.000	-0.001	-0.001	-0.003***
	(-2.00)	(0.47)	(-1.01)	(-1.34)	(-3.64)
Intercept	0.019	-0.026	-0.011	-0.074	-0.033
	(0.61)	(-1.33)	(-0.14)	(-0.90)	(-0.20)
R-squared	0.0342	0.0734	0.0447	0.0803	0.1062
Obs.	1572	1572	1572	1572	1572

Table9 The impact of discredited VCs on post-IPO survival

The table display results using Cox hazard proportional models to investigate the impact of the participation of discredited VCs in IPO firms on post-offering survival. In specification (1), we define failed firms as those were delisted during negative reasons. In specification (2), we include failed firms as those were either delisted due to negative reasons or acquired by other firms. We define discredited VC-backed IPO as if the new issuing firms have any VCs who failed to prevent IPO fraud and lead to post-offering litigations in the past. Thus, DVC is a dummy taking the value of one if the IPO firms have any discredited VCs, otherwise is zero. All variables are defined in the appendix. All regressions include year and industry controls. One, two and three asterisks denote statistical significance at the 10%, 5% and 1% level. The Z-statistics are included in the parentheses and hazards ratios are displayed on the left. All variables are defined in Appendix A.

	(1)		(2)	
	Exclude M&A		Include M&A	
	Coeff.	HR	Coeff.	HR
DVC	0.293*	1.341	0.347***	1.415
	(1.69)		(3.52)	
Firm age	-0.095	0.909	-0.061	0.941
	(-1.11)		(-1.21)	
Ln(proceeds)	0.143	1.153	0.099*	1.104
	(1.49)		(1.74)	
Underpricing	-0.006***	0.994	-0.003***	0.997
	(-4.04)		(-4.35)	
Underwriter	-0.322**	0.725	-0.163**	0.850
	(-2.29)		(-2.06)	
Auditor	0.172	1.188	0.108	1.114
	(1.32)		(1.40)	
High tech	0.098	1.103	0.250**	1.284
	(0.72)		(3.12)	
Ln(sales)	-0.293***	0.746	-0.067**	0.935
	(-5.58)		(-2.13)	
Leverage	0.927***	2.526	0.411***	1.508
	(4.40)		(3.52)	
Profitability	-0.255	0.775	-0.170	0.844
	(-1.15)		(-1.26)	
Chi-square	178.566		166.347	
Chi-square	0.000		0.000	
Obs.	1278		1278	

Table 10 Discredited VCs and future litigation risks

The table display results using logistic regression models to investigate the impact of the participation of discredited VCs in IPO firms on post-offering litigations. The dependent variable is a dummy indicating whether the firm was involved in lawsuits after going public, but not include the first time that the VC-backed IPOs were sued. We define discredited VC-backed IPO as if the new issuing firms have any VCs who failed to prevent IPO fraud and lead to post-offering litigations in the past. Thus, DVC is a dummy taking the value of one if the IPO firms have any discredited VCs, otherwise is zero. All variables are defined in the appendix. All regressions include year and industry controls. One, two and three asterisks denote statistical significance at the 10%, 5% and 1% level. The Z-statistics are included in the parentheses. All variables are defined in Appendix A.

	(1)	(2)	(3)	(4)	(5)
DVC	0.619***	0.473***	0.337*	0.382*	0.831***
	(3.73)	(2.66)	(1.76)	(1.95)	(3.25)
Underpricing		0.013***	0.012***	0.012***	0.017***
		(7.96)	(7.35)	(7.04)	(6.97)
Firm age			-0.500***	-0.462***	-0.486***
			(-3.78)	(-3.48)	(-3.50)
Ln(total assets)			0.258***	0.232***	0.227***
			(4.18)	(3.49)	(3.36)
High tech			0.625***	0.591***	0.568***
			(3.24)	(3.01)	(2.92)
Underwriter				0.724***	0.783***
				(2.59)	(2.74)
Auditor				-0.164	-0.227
				(-0.69)	(-0.93)
DVC*Underpricing					-0.008***
					(-2.61)
Intercept	-2.505***	-3.008***	-3.158***	-3.575***	-3.760***
	(-20.57)	(-21.01)	(-9.48)	(-9.04)	(-9.04)
Pseudo R-squared	0.013	0.0134	0.165	0.174	0.183
Obs.	1658	1658	1658	1658	1658

Appendix A

Variable definitions

Measures of discredited VC	
DVC	Dummy variable taking 1 if the IPO firm is supported by any VCs who had backed fraudulent IPOs in the past, otherwise is 0.
DVC(%)	Number of discredited VCs in an IPO firm scaled by all VCs.
Control variables	
Firm age	Nature logarithms of one plus an IPO firm's age. The firm age is measured at the difference between the firm's IPO year and the year of establishment.
Ln(proceeds)	Nature logarithms of total proceeds that a firm raises during the process of going public.
Ln (total assets)	Nature logarithms of the firm's total assets in the IPO year.
Leverage	The ratio of total liabilities over total assets before the IPO.
Underwriter	Dummy variable taking 1 if underwriter's rank is equal to 7 or above, otherwise is 0.
Auditor	Dummy variable taking 1 if an IPO firm hired big-4 auditor, otherwise is 0.
Share overhang	The ratio of pre-IPO shares retained over shares filed during IPO, where pre-IPO shares retained contains shares owned by the pre-IPO shareholder that are not sold in the offering and share filed includes primary and secondary shares.
Ln(no of bookrunners)	Nature logarithms of the number of bookrunners working together during Initial Public Offering.
High tech	Dummy variable taking 1 if an IPO firm is in the high-tech industry, otherwise is 0.
Bubble period	Dummy variable taking 1 if a firm went public during the bubble period, otherwise is 0.
Profitability	The ratio of earnings before interest, taxes, depreciation, and amortization (EBITDA) to total assets in the IPO year.
IPO performance measures	
Underpricing	the percentage change from share price on the first day of trading to the offer price.
Revision	The percentage change from offer price to the mid of filling price range.
Operating return on assets	The ratio of operating income before depreciation to total assets.
BHAR	Buy and hold abnormal returns measured as :
IPO litigation	
IPO delisting	Dummy variable taking 1 if an IPO was delisted due to negative reasons, otherwise is 0.

Appendix B Correlation matrix

Panel A Correlation matrix for IPO underpricing and revision analysis

	Firm age	Ln(proceeds)	Ln(total assets)	Leverage	Underwriter	Auditor	Share overhang	Ln(no of bookrunners)
Firm age	1.000							
Ln(proceeds)	0.146	1.000						
Ln(total assets)	0.362	0.621	1.000					
Leverage	0.194	0.089	0.260	1.000				
Underwriter	-0.037	0.394	0.322	0.023	1.000			
Auditor	0.024	0.182	0.137	-0.034	0.131	1.000		
Share overhang	-0.101	0.028	-0.006	-0.032	0.116	0.028	1.000	
Ln(no of bookrunners)	0.205	0.516	0.472	0.108	0.091	0.185	-0.055	1.000

Panel B Correlation matrix for post-IPO performance

	Firm age	Ln(proceeds)	Ln(total assets)	Underwriter	High tech	Bubble period	Underpricing	Revision
Firm age	1.000							
Ln(proceeds)	0.146	1.000						
Ln(total assets)	0.362	0.621	1.000					
Underwriter	-0.037	0.394	0.322	1.000				
High tech	-0.079	-0.041	-0.108	0.043	1.000			
Bubble period	-0.222	0.144	-0.102	0.203	0.134	1.000		
Underpricing	-0.162	0.166	-0.059	0.209	0.179	0.421	1.000	
Revision	-0.084	0.232	-0.012	0.116	0.204	0.155	0.376	1.000

Panel C Correlation matrix for survival analysis

	Firm age	Ln(proceed)	Underpricing	Underwriter	Auditor	High tech	Ln(sales)	Leverage	Profitability
Firm age	1.000								
Ln(proceeds)	0.104	1.000							
Underpricing	-0.175	0.214	1.000						
Underwriter	-0.043	0.429	0.236	1.000					
Auditor	0.014	0.136	0.052	0.111	1.000				
High tech	-0.094	-0.048	0.189	0.021	0.014	1.000			
Ln(sales)	0.499	0.416	-0.114	0.152	0.025	-0.066	1.000		
Leverage	0.222	0.135	-0.126	0.070	-0.053	-0.125	0.333	1.000	
Profitability	0.303	0.148	-0.060	0.012	0.003	0.013	0.523	-0.234	1.000

Chapter 5 Conclusion

5.1 Summary and concluding remarks

Since going public is a vital stage of a firm's life circle, this study provides innovative evidence of how various factors affect IPO performance. In Chapter 2, we investigate how political corruption influence the process of a firm's IPO and its underpricing. In Chapter 3, we explore the association between an IPO firm's geographically dispersed business interests and its corporate failure in the periods after the offering. In Chapter 4, we question the impact of reputation damaged VCs on IPO performance.

Specifically, in Chapter 2, we conjecture that political corruption aggregates information asymmetry in the local market and increases the value uncertainty of IPO firms. Consistent with this argument, we find that newly listed firms experience greater underpricing on the first day of trading in a corrupt environment, implying potential loess for those issuers. Evidence also suggests that the corruption-effect on underpricing is the most prominent if IPO firms have increased business concentration around the state where the headquarter locates. Moreover, political corruption also reduces firms' post-IPO performance, as measured by the change of Tobin's Q, capital expenditure, and profitability.

Furthermore, we also reveal evidence that underwriters execute their certification roles in a corrupt environment. Particularly, prestigious underwriters make efforts to extract information from investors by frequently revising offer price, resulting in a greater number of revisions. Importantly, they help issuers reduce the level of underpricing when local corruption is high, but charging more commissions from those firms. Finally, we document that political corruption does not reduce the likelihood of achieving positive insider's wealth gains, which is attributed to underwriter's promoting efforts.

In Chapter 3, we use the number of state citations as proxy for IPO firm's geographically dispersed business interests. Our empirical evidence suggests that the level of firms' spatially distributed operations is positively related to their post-offering failure risks. Moreover, the soft operating information environment has predominated geographically dispersed IPO firm's failures, as the information becomes more difficult to transfer in such an environment, resulting in more significant information asymmetry problem within the organization. Further, because the soft information mainly replies on personal interactions, we document that dispersed newly listed firms are more likely to fail in small communities (e.g., with less population) in a soft information environment where social concerns have a significant impact on managerial decision making, which deteriorate agency conflicts between managers and shareholders. We also document that geographically dispersed IPO firms experience declined operating performance in the post-offering periods. Thus, empirical findings are consistent with our hypothesis that geographic dispersion caused organizational information asymmetry negatively affect the manager's decision making and deteriorate agency problems, which ultimately result in corporate failures.

We also investigate how discredited VCs affect IPO performance. In Chapter 4, we measure discredited VCs as those who did not prevent IPO fraud and result in post-offering lawsuits. In the empirical analysis, we find that IPOs supported by any discredited VCs left large amount of "money on the table" (e.g., higher underpricing). Moreover, we find increased offer price revisions in those firms. Thus, the results suggest that discredited VCs are reputation damaged and lead to great information disparity between issuers and investors. Further, discredited VC-backed IPOs are associated with declined operating returns on assets, BHARs, and are more likely to fail in the periods subsequent to the offering. This stream of evidence suggests that discredited VCs do not possess as strong managerial ability as other VCs who never experienced monitoring failures, as their backed IPOs are value-decreasing after going public. Finally, we document that discredited VCs allow higher underpricing because they have the incentive to avoid future IPO lawsuits. Thus, our study may enable investors to adjust their valuation on IPOs with VCs who committed to monitoring failures when making investment decisions.

5.2 Research limitations

We acknowledge that this thesis may subject to several research limitations. In our first study which examines the relationship between a politically corrupt environment and IPO short-run performance (e.g., underpricing), we use observed corruption conviction cases from the Department of Justice in the U.S. and measure corrupt environment at the state level. However, it is not clear about how managers' attitude to corruption is on the firm level. In this regard, we may expect firm managers who have the intention of using briberies can impose a significant impact on corporate performance (e.g., see, Mironov (2015) for such evidence in Russia; Liu (2016)). Further, previous studies suggest that investors enjoy local information bias (e.g., Loughran and Schultz (2005)). Nielsson and Wójcik (2016) distinguish IPO firms between rural and urban locations and find rurally located issuers incur lower underpricing. Thus, we may conjecture that rural investors may be more sensitive to political corruption because they rely on local information. However, retrieving corruption information at the city or county level is not possible because of the data availability.

Moreover, concerning the analysis of the impact of firms' geographic dispersion on post-IPO survival, our study only concentrates the research area in the public capital market. Because firms in private stages may experience fewer challenges compared to public firms, we believe that our study would provide a more comprehensive understanding of the effect of geographic dispersion on corporate failures by considering private firms. Nevertheless, we do not further explore this research question because the availability of such data from private firms are not available.

Last but not least, for the third study, we only explore the relationship between discredited VCs and IPO performance. Thus, it is also interesting to examine VCs' returns and how the shares are finally distributed to LPs in those IPOs. However, those data remain confidential to venture capitalists and not available to the public.

Despite the limitations stated above, this thesis makes significant contributions to the extant literature in IPO performance (e.g., underpricing), post-offering survival, and venture capital financing in newly listed firms.

5.3 Recommendations for future work

Concerning the future, we suggest the following possible research directions. First, since political corruption negatively affects IPO short-run performance (e.g., underpricing), it is meaningful to investigate how such corruption-effect is related to the IPOs' long-run performance, such as post-offering failure risks. Moreover, future work can also explore insiders' share trading behaviors in post-IPO periods; because insiders may have the incentive to get rid of the corrupt environment, thereby selling a significant portion of shares they held after the firm goes public. In addition, our study is focused on the impact of corruption in the U.S.; future research can extend this topic to other areas of the world. Because the differing political backgrounds and regulations in various counties, corruption may have distinctive shocks to economic outcomes (e.g., Leff (1964); Lui (1985); Michael T Rock and Bonnett (2004)). To this end, we believe that an international context will provide a more insightful understanding of how political corruption affects IPO performance.

Furthermore, corresponding to our research limitations, we encourage researchers to adopt different means to collect geographic dispersion data for private firms (e.g., interviews). We also suggest future studies to highlight the importance of managerial aspects related to geographically dispersed firms' survival, such as CEOs' management ability in those firms. For example, CEOs in those firms may be more opportunistic and increase the use of earnings management. In addition, shareholders may not monitor dispersed firms well because of the problem with internal information flow and severe agency conflicts in those firms; and later studies can investigate VCs' investment preference in geographically dispersed firms. An interesting finding would be that VCs are less likely to invest in firms with a higher level of geographic dispersion because of the monitoring difficulties.

Finally, for our study on the association between discredited VCs and IPO performance, we suggest future research studies to explore those VCs' behaviors in newly listed firms. For example, due to monitoring failures in previously backed IPOs, VCs may adopt more rigorous staged financing approach and take more powerful board positions in order to monitor the IPO firms better. They may also provide follow-on capital in the post-offering periods and cash out from firms later. We believe that these research directions will broaden specific knowledge in venture capital financing field.

References

Addoum, J.M., Kumar, A. and Law, K., 2017. Slow diffusion of state-level information and return predictability. *Working Paper, University of Miami*.
Ades, A. and Tella, R.D., 1997. National Champions and Corruption: Some Unpleasant Interventionist Arithmetic. *The Economic Journal,* 107(443), pp. 1023-1042.
Alesina, A. and Angeletos, G.-M., 2005. Corruption, inequality, and fairness. *Journal of Monetary Economics,* 52(7), pp. 1227-1244.
Alesina, A., Baqir, R. and Easterly, W., 2000. Redistributive public employment. *Journal of Urban Economics,* 48(2), pp. 219-241.
Allison, P.D., 2010. *Survival analysis using SAS: a practical guide.* SAS Institute.
Amihud, Y., Hauser, S. and Kirsh, A., 2003. Allocations, adverse selection, and cascades in IPOs: Evidence from the Tel Aviv Stock Exchange. *Journal of Financial Economics,* 68(1), pp. 137-158.
Amit, R., Brander, J. and Zott, C., 1998. Why do venture capital firms exist? Theory and Canadian evidence. *Journal of Business Venturing,* 13(6), pp. 441-466.
Amore, M.D. and Bennedsen, M., 2013. The value of local political connections in a low-corruption environment. *Journal of Financial Economics,* 110(2), pp. 387-402.
An, H.H. and Chan, K.C., 2008. Credit ratings and IPO pricing. *Journal of Corporate Finance,* 14(5), pp. 584-595.
Ang, J.S. and Brau, J.C., 2003. Concealing and confounding adverse signals: Insider wealth-maximizing behavior in the IPO process. *Journal of Financial Economics,* 67(1), pp. 149-172.
Atanasov, V., Ivanov, V. and Litvak, K., 2012. Does reputation limit opportunistic behavior in the VC industry? Evidence from litigation against VCs. *The Journal of Finance,* 67(6), pp. 2215-2246.
Athanasouli, D. and Goujard, A., 2015. Corruption and management practices: Firm level evidence. *Journal of Comparative Economics,* 43(4), pp. 1014-1034.
Bai, J., Jayachandran, S., Malesky, E.J. and Olken, B.A., 2014. Does Economic Growth Reduce Corruption? Theory and Evidence from Vietnam. *National Bureau of Economic Research*.
Bajo, E. and Raimondo, C., 2017. Media sentiment and IPO underpricing. *Journal of Corporate Finance,* 46, pp. 139-153.
Banerjee, S., Dai, L. and Shrestha, K., 2011. Cross-country IPOs: What explains differences in underpricing? *Journal of Corporate Finance,* 17(5), pp. 1289-1305.
Banerjee, S., Güçbilmez, U. and Pawlina, G., 2016. Leaders and followers in hot IPO markets. *Journal of Corporate Finance,* 37, pp. 309-334.

Barry, C.B., Muscarella, C.J., Peavy, J.W. and Vetsuypens, M.R., 1990. The role of venture capital in the creation of public companies: Evidence from the going-public process. *Journal of Financial Economics,* 27(2), pp. 447-471.
Baucus, M.S. and Baucus, D.A., 1997. Paying the piper: An empirical examination of longer-term financial consequences of illegal corporate behavior. *Academy of Management Journal,* 40(1), pp. 129-151.
Beatty, R.P., Bunsis, H. and Hand, J.R., 1998. The indirect economic penalties in SEC investigations of underwriters. *Journal of Financial Economics,* 50(2), pp. 151-186.
Beatty, R.P. and Ritter, J.R., 1986. Investment banking, reputation, and the underpricing of initial public offerings. *Journal of Financial Economics,* 15(1), pp. 213-232.
Benveniste, L.M., Busaba, W.Y. and Wilhelm Jr, W.J., 2002. Information externalities and the role of underwriters in primary equity markets. *Journal of Financial Intermediation,* 11(1), pp. 61-86.
Benveniste, L.M., Ljungqvist, A., Wilhelm Jr, W.J. and Yu, X., 2003. Evidence of information spillovers in the production of investment banking services. *The Journal of Finance,* 58(2), pp. 577-608.
Benveniste, L.M. and Spindt, P.A., 1989. How investment bankers determine the offer price and allocation of new issues. *Journal of Financial Economics,* 24(2), pp. 343-361.
Berger, A.N., Miller, N.H., Petersen, M.A., Rajan, R.G. and Stein, J., 2005. Does function follow organizational form? Evidence from the lending practices of large and small banks. *Journal of Financial Economics,* 76(2), pp. 237-269.
Bernile, G., Kumar, A. and Sulaeman, J., 2015. Home away from home: Geography of information and local investors. *The Review of Financial Studies,* 28(7), pp. 2009-2049.
Bernstein, S., 2015. Does going public affect innovation? *The Journal of Finance,* 70(4), pp. 1365-1403.
Bertrand, M. and Schoar, A., 2003. Managing with style: The effect of managers on firm policies. *The Quarterly Journal of Economics,* 118(4), pp. 1169-1208.
Bhagat, S., Bizjak, J. and Coles, J.L., 1998. The shareholder wealth implications of corporate lawsuits. *Financial Management*, pp. 5-27.
Bliss, C. and Tella, R.D., 1997. Does competition kill corruption? *Journal of Political Economy,* 105(5), pp. 1001-1023.
Bloom, N. and Van Reenen, J., 2010. Why do management practices differ across firms and countries? *The Journal of Economic Perspectives,* 24(1), pp. 203-224.
Bottazzi, L. and Da Rin, M., 2002. Venture capital in Europe and the financing of innovative companies. *Economic policy,* 17(34), pp. 229-270.
Bottazzi, L., Da Rin, M. and Hellmann, T., 2008. Who are the active investors?: Evidence from venture capital. *Journal of Financial Economics,* 89(3), pp. 488-512.

Boulton, T.J. and Campbell, T.C., 2016. Managerial confidence and initial public offerings. *Journal of Corporate Finance,* 37, pp. 375-392.
Boylan, R.T. and Long, C.X., 2003. Measuring public corruption in the American states: A survey of state house reporters. *State Politics & Policy Quarterly,* 3(4), pp. 420-438.
Bradley, D.J. and Jordan, B.D., 2002. Partial adjustment to public information and IPO underpricing. *Journal of Financial and Quantitative Analysis,* 37(04), pp. 595-616.
Brav, A. and Gompers, P.A., 1997. Myth or reality? The long‐run underperformance of initial public offerings: Evidence from venture and nonventure capital‐backed companies. *The Journal of Finance,* 52(5), pp. 1791-1821.
Butler, A.W., Fauver, L. and Mortal, S., 2009. Corruption, political connections, and municipal finance. *Review of Financial Studies*, p. hhp010.
Cao, J., Jiang, F. and Ritter, J.R., 2013. Patent and Innovation-Driven Performance in Venture Capital-Backed IPOs. *Available at SSRN,* 2364668.
Carter, R.B., Dark, F.H. and Singh, A.K., 1998. Underwriter reputation, initial returns, and the long‐run performance of IPO stocks. *The Journal of Finance,* 53(1), pp. 285-311.
Celikyurt, U., Sevilir, M. and Shivdasani, A., 2010. Going public to acquire? The acquisition motive in IPOs. *Journal of Financial Economics,* 96(3), pp. 345-363.
Chandler, A.D., 1991. The functions of the HQ unit in the multibusiness firm. *Strategic Management Journal,* 12(S2), pp. 31-50.
Chen, Z. and Wilhelm, W.J., 2008. A theory of the transition to secondary market trading of IPOs. *Journal of Financial Economics,* 90(3), pp. 219-236.
Chiang, Y.-M., Qian, Y. and Sherman, A.E., 2010. Endogenous entry and partial adjustment in IPO auctions: Are institutional investors better informed? *Review of Financial Studies,* 23(3), pp. 1200-1230.
Choy, S.K., Lai, T.-K. and Ng, T., 2017. Do tax havens create firm value? *Journal of Corporate Finance,* 42, pp. 198-220.
Christoffersen, S.K., Nain, A. and Tang, Y., 2010. IPO Cycles, Firm Characteristics, and the Role of Underwriters. *Working Paper*.
Cliff, M.T. and Denis, D.J., 2004. Do initial public offering firms purchase analyst coverage with underpricing? *The Journal of Finance,* 59(6), pp. 2871-2901.
Çolak, G., Durnev, A. and Qian, Y., 2017. Political uncertainty and IPO activity: Evidence from US gubernatorial elections. *Journal of Financial and Quantitative Analysis*, pp. 1-42.
Çolak, G. and Günay, H., 2011. Strategic waiting in the IPO markets. *Journal of Corporate Finance,* 17(3), pp. 555-583.
Collis, D., Young, D. and Goold, M., 2007. The size, structure, and performance of corporate headquarters. *Strategic Management Journal,* 28(4), pp. 383-405.
Cook, D.O., Kieschnick, R. and Van Ness, R.A., 2006. On the marketing of IPOs. *Journal of Financial Economics,* 82(1), pp. 35-61.

Cooney, J.W., Madureira, L., Singh, A.K. and Yang, K., 2015. Social ties and IPO outcomes. *Journal of Corporate Finance,* 33, pp. 129-146.
Corwin, S.A. and Schultz, P., 2005. The role of IPO underwriting syndicates: Pricing, information production, and underwriter competition. *The Journal of Finance,* 60(1), pp. 443-486.
Coval, J.D. and Moskowitz, T.J., 1999. Home bias at home: Local equity preference in domestic portfolios. *The Journal of Finance,* 54(6), pp. 2045-2073.
Cumming, D., Haslem, B. and Knill, A., 2017. Entrepreneurial Litigation and Venture Capital Finance. *Journal of Financial and Quantitative Analysis,* 52(5), pp. 2217-2250.
Dal Bó, E. and Rossi, M.A., 2007. Corruption and inefficiency: Theory and evidence from electric utilities. *Journal of Public Economics,* 91(5), pp. 939-962.
David, C.R., 1972. Regression models and life tables (with discussion). *Journal of the Royal Statistical Society,* 34, pp. 187-220.
Dechow, P.M., Sloan, R.G. and Sweeney, A.P., 1996. Causes and consequences of earnings manipulation: An analysis of firms subject to enforcement actions by the SEC. *Contemporary Accounting Research,* 13(1), pp. 1-36.
Delios, A. and Beamish, P.W., 1999. Ownership strategy of Japanese firms: Transactional, institutional, and experience influences. *Strategic Management Journal*, pp. 915-933.
Delios, A. and Henisz, W.I., 2000. Japanese firms' investment strategies in emerging economies. *Academy of Management journal,* 43(3), pp. 305-323.
Demers, E. and Joos, P., 2007. IPO failure risk. *Journal of Accounting Research,* 45(2), pp. 333-371.
Denis, D.J., Denis, D.K. and Yost, K., 2002. Global diversification, industrial diversification, and firm value. *The Journal of Finance,* 57(5), pp. 1951-1979.
Dickson, P.R. and Ginter, J.L., 1987. Market segmentation, product differentiation, and marketing strategy. *Journal of marketing,* 51(2), pp. 1-10.
Dixit, A.K., 2015. How business community institutions can help fight corruption. *The World Bank Economic Review,* 29(suppl 1), pp. S25-S47.
Durnev, A. and Fauver, L., 2011. *Stealing from thieves: Expropriation risk, firm governance, and performance*. University of Tennessee,Knoxville,TN.
Duru, A. and Reeb, D.M., 2002. International diversification and analysts' forecast accuracy and bias. *The Accounting Review,* 77(2), pp. 415-433.
Dyreng, S.D., Lindsey, B.P. and Thornock, J.R., 2013. Exploring the role Delaware plays as a domestic tax haven. *Journal of Financial Economics,* 108(3), pp. 751-772.
Eisenhardt, K.M., 1985. Control: Organizational and economic approaches. *Management Science,* 31(2), pp. 134-149.
Ekkayokkaya, M. and Pengniti, T., 2012. Governance reform and IPO underpricing. *Journal of Corporate Finance,* 18(2), pp. 238-253.

Espenlaub, S., Khurshed, A. and Mohamed, A., 2012. IPO survival in a reputational market. *Journal of Business Finance & Accounting,* 39(3‐4), pp. 427-463.
Espenlaub, S., Khurshed, A., Mohamed, A. and Saadouni, B., 2016. Committed anchor investment and IPO survival–The roles of cornerstone and strategic investors. *Journal of Corporate Finance,* 41, pp. 139-155.
Fama, E.F. and French, K.R., 2004. New lists: Fundamentals and survival rates. *Journal of Financial Economics,* 73(2), pp. 229-269.
Faulkender, M. and Petersen, M.A., 2006. Does the source of capital affect capital structure? *Review of Financial Studies,* 19(1), pp. 45-79.
Fisman, R. and Gatti, R., 2002. Decentralization and corruption: evidence across countries. *Journal of Public Economics,* 83(3), pp. 325-345.
Fisman, R. and Svensson, J., 2007. Are corruption and taxation really harmful to growth? Firm level evidence. *Journal of Development Economics,* 83(1), pp. 63-75.
Fulghieri, P. and Sevilir, M., 2009. Size and focus of a venture capitalist's portfolio. *Review of Financial Studies,* 22(11), pp. 4643-4680.
Gao, W., Ng, L. and Wang, Q., 2008. Does geographic dispersion affect firm valuation? *Journal of Corporate Finance,* 14(5), pp. 674-687.
Garcia, D. and Norli, Ø., 2012. Geographic dispersion and stock returns. *Journal of Financial Economics,* 106(3), pp. 547-565.
Garmaise, M.J. and Moskowitz, T.J., 2003. Confronting information asymmetries: Evidence from real estate markets. *The Review of Financial Studies,* 17(2), pp. 405-437.
Garrett, J., Hoitash, R. and Prawitt, D., 2014. Trust and financial reporting quality. *Journal of Accounting Research,* 52(5), pp. 1087-1125.
Gill, A. and Walz, U., 2016. Are VC-backed IPOs delayed trade sales? *Journal of Corporate Finance,* 37, pp. 356-374.
Giroud, X., 2013. Proximity and investment: Evidence from plant-level data. *The Quarterly Journal of Economics,* 128(2), pp. 861-915.
Glaeser, E.L. and Saks, R.E., 2006. Corruption in America. *Journal of Public Economics,* 90(6), pp. 1053-1072.
Gompers, P. and Lerner, J., 1998. Venture capital distributions: Short‐run and long‐run reactions. *The Journal of Finance,* 53(6), pp. 2161-2183.
Gompers, P.A., 1996. Grandstanding in the venture capital industry. *Journal of Financial Economics,* 42(1), pp. 133-156.
Gorman, M. and Sahlman, W.A., 1989. What do venture capitalists do? *Journal of Business Venturing,* 4(4), pp. 231-248.
Gounopoulos, D., Kallias, A., Kallias, K. and Tzeremes, P.G., 2017. Political money contributions of US IPOs. *Journal of Corporate Finance,* 43, pp. 19-38.
Gounopoulos, D. and Pham, H., 2018. Specialist CEOs and IPO survival. *Journal of Corporate Finance,* 48, pp. 217-243.

Habib, M.A. and Ljungqvist, A.P., 2001. Underpricing and entrepreneurial wealth losses in IPOs: Theory and evidence. *Review of Financial Studies,* 14(2), pp. 433-458.
Hanley, K.W., 1993. The underpricing of initial public offerings and the partial adjustment phenomenon. *Journal of Financial Economics,* 34(2), pp. 231-250.
Hanley, K.W. and Hoberg, G., 2012. Litigation risk, strategic disclosure and the underpricing of initial public offerings. *Journal of Financial Economics,* 103(2), pp. 235-254.
Helbing, P., Lucey, B.M. and Vigne, S.A., 2019. The determinants of IPO withdrawal–Evidence from Europe. *Journal of Corporate Finance*.
Hellmann, T. and Puri, M., 2002. Venture capital and the professionalization of start‐up firms: Empirical evidence. *The Journal of Finance,* 57(1), pp. 169-197.
Hensler, D.A., Rutherford, R.C. and Springer, T.M., 1997. The survival of initial public offerings in the aftermarket. *Journal of Financial Research,* 20(1), pp. 93-110.
Hill, C.W., Hitt, M.A. and Hoskisson, R.E., 1992. Cooperative versus competitive structures in related and unrelated diversified firms. *Organization Science,* 3(4), pp. 501-521.
Himmelberg, C.P., Hubbard, R.G. and Palia, D., 1999. Understanding the determinants of managerial ownership and the link between ownership and performance. *Journal of Financial Economics*

53(3), pp. 353-384.
Hochberg, Y.V., 2011. Venture capital and corporate governance in the newly public firm. *Review of Finance,* 16(2), pp. 429-480.
Hsu, D.H., 2004. What do entrepreneurs pay for venture capital affiliation? *The Journal of Finance,* 59(4), pp. 1805-1844.
Jain, B.A., Jayaraman, N. and Kini, O., 2008. The path-to-profitability of Internet IPO firms. *Journal of Business Venturing,* 23(2), pp. 165-194.
Jain, B.A. and Kini, O., 1994. The post‐issue operating performance of IPO firms. *The Journal of Finance,* 49(5), pp. 1699-1726.
Jain, B.A. and Kini, O., 2000. Does the presence of venture capitalists improve the survival profile of IPO firms? *Journal of Business Finance & Accounting,* 27(9‐10), pp. 1139-1183.
Jain, B.A. and Kini, O., 2008. The impact of strategic investment choices on Post‐issue operating performance and survival of US IPO firms. *Journal of Business Finance & Accounting,* 35(3‐4), pp. 459-490.
Jennings, J.N., Seo, H. and Tanlu, L., 2013. The effect of organizational complexity on earnings forecasting behavior. *Working papers, Washington University in St.Louis*.
Jensen, M.C. and Meckling, W.H., 1976. Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics,* 3(4), pp. 305-360.

Jiang, G., Lee, C.M. and Zhang, Y., 2005. Information uncertainty and expected returns. *Review of Accounting Studies,* 10(2-3), pp. 185-221.
John, K., Knyazeva, A. and Knyazeva, D., 2011. Does geography matter? Firm location and corporate payout policy. *Journal of Financial Economics,* 101(3), pp. 533-551.
Khanna, T. and Palepu, K., 2000. Is group affiliation profitable in emerging markets? An analysis of diversified Indian business groups. *The Journal of Finance,* 55(2), pp. 867-891.
Krishnan, C., Ivanov, V.I., Masulis, R.W. and Singh, A.K., 2011. Venture capital reputation, post-IPO performance, and corporate governance. *Journal of Financial and Quantitative Analysis,* 46(5), pp. 1295-1333.
Landier, A., Nair, V.B. and Wulf, J., 2009. Trade-offs in staying close: Corporate decision making and geographic dispersion. *The Review of Financial Studies,* 22(3), pp. 1119-1148.
Lee, P.M. and Wahal, S., 2004. Grandstanding, certification and the underpricing of venture capital backed IPOs. *Journal of Financial Economics,* 73(2), pp. 375-407.
Leff, N.H., 1964. Economic development through bureaucratic corruption. *American Behavioral Scientist,* 8(3), pp. 8-14.
Leone, A.J., Rock, S. and Willenborg, M., 2007. Disclosure of intended use of proceeds and underpricing in initial public offerings. *Journal of Accounting Research,* 45(1), pp. 111-153.
Lerner, J., 1995. Venture capitalists and the oversight of private firms. *Journal of Finance,* 50(1), pp. 301-318.
Levis, M., 1990. The winner's curse problem, interest costs and the underpricing of initial public offerings. *The Economic Journal,* 100(399), pp. 76-89.
Li, X., Wang, S.S. and Wang, X., 2019. Trust and IPO underpricing. *Journal of Corporate Finance,* 56, pp. 224-248.
Lin, C. and Su, D., 2008. Industrial diversification, partial privatization and firm valuation: Evidence from publicly listed firms in China. *Journal of Corporate Finance,* 14(4), pp. 405-417.
Litov, L.P., Moreton, P. and Zenger, T.R., 2012. Corporate strategy, analyst coverage, and the uniqueness paradox. *Management Science,* 58(10), pp. 1797-1815.
Liu, X., 2016. Corruption culture and corporate misconduct. *Journal of Financial Economics,* 122(2), pp. 307-327.
Liu, X. and Ritter, J.R., 2011. Local underwriter oligopolies and IPO underpricing. *Journal of Financial Economics,* 102(3), pp. 579-601.
Ljungqvist, A., Nanda, V. and Singh, R., 2006. Hot markets, investor sentiment, and IPO pricing. *The Journal of Business,* 79(4), pp. 1667-1702.
Ljungqvist, A. and Wilhelm, W.J., 2003. IPO pricing in the dot-com bubble. *The Journal of Finance,* 58(2), pp. 723-752.

Ljungqvist, A.P. and Wilhelm, W.J., 2002. IPO allocations: discriminatory or discretionary? *Journal of Financial Economics,* 65(2), pp. 167-201.
Lochner, L., 2007. Education and crime. *University of Western Ontario,* 5(8), pp. 1-14.
Lopez-de-Silanes, F., Phalippou, L. and Gottschalg, O., 2015. Giants at the gate: Investment returns and diseconomies of scale in private equity. *Journal of Financial and Quantitative Analysis,* 50(3), pp. 377-411.
Loughran, T. and McDonald, B., 2013. IPO first-day returns, offer price revisions, volatility, and form S-1 language. *Journal of Financial Economics,* 109(2), pp. 307-326.
Loughran, T. and Ritter, J.R., 1995. The new issues puzzle. *The Journal of finance,* 50(1), pp. 23-51.
Loughran, T. and Ritter, J.R., 2002. Why don't issuers get upset about leaving money on the table in IPOs? *Review of Financial Studies,* 15(2), pp. 413-444.
Loughran, T. and Ritter, J.R., 2004. Why has IPO underpricing changed over time? *Financial Management,* 33, pp. 5-37.
Loughran, T. and Schultz, P., 2005. Liquidity: Urban versus rural firms. *Journal of Financial Economics,* 78(2), pp. 341-374.
Lowry, M. and Shu, S., 2002. Litigation risk and IPO underpricing. *Journal of Financial Economics,* 65(3), pp. 309-335.
Lui, F.T., 1985. An equilibrium queuing model of bribery. *Journal of Political Economy,* 93(4), pp. 760-781.
Marcato, G., Milcheva, S. and Zheng, C., 2018. Market integration, country institutions and IPO underpricing. *Journal of Corporate Finance,* 53, pp. 87-105.
Marciukaityte, D., Szewczyk, S.H., Uzun, H. and Varma, R., 2006. Governance and performance changes after accusations of corporate fraud. *Financial Analysts Journal,* 62(3), pp. 32-41.
Mauer, D.C., Wang, S., Wang, X. and Zhang, Y., 2015. Global diversification and IPO returns. *Journal of Banking & Finance,* 58, pp. 436-456.
Mauro, P., 1995. Corruption and growth. *The Quarterly Journal of Economics*, pp. 681-712.
Megginson, W.L. and Weiss, K.A., 1991. Venture capitalist certification in initial public offerings. *The Journal of Finance,* 46(3), pp. 879-903.
Merton, R.C., 1987. A simple model of capital market equilibrium with incomplete information. *The journal of finance,* 42(3), pp. 483-510.
Meyer, K.E., 2006. Globalfocusing: From domestic conglomerates to global specialists. *Journal of management studies,* 43(5), pp. 1109-1144.
Mironov, M., 2015. Should one hire a corrupt CEO in a corrupt country? *Journal of Financial Economics,* 117(1), pp. 29-42.
Mo, P.H., 2001. Corruption and economic growth. *Journal of Comparative Economics,* 29(1), pp. 66-79.
Murphy, K.M., Shleifer, A. and Vishny, R.W., 1993. Why is rent-seeking so costly to growth? *The American Economic Review,* 83(2), pp. 409-414.

Nahata, R., 2008. Venture capital reputation and investment performance. *Journal of Financial Economics,* 90(2), pp. 127-151.
Neupane, S., Paudyal, K. and Thapa, C., 2014. Firm quality or market sentiment: What matters more for IPO investors? *Journal of Banking & Finance,* 44, pp. 207-218.
Neus, W. and Walz, U., 2005. Exit timing of venture capitalists in the course of an initial public offering. *Journal of Financial Intermediation,* 14(2), pp. 253-277.
Nguyen, T.T. and Van Dijk, M.A., 2012. Corruption, growth, and governance: Private vs. state-owned firms in Vietnam. *Journal of Banking & Finance,* 36(11), pp. 2935-2948.
Nielsson, U. and Wójcik, D., 2016. Proximity and IPO underpricing. *Journal of Corporate Finance,* 38, pp. 92-105.
North, D.C., 1990. *Institutions, institutional change and economic performance.* Cambridge University Press,Cambridge.
Paunov, C., 2016. Corruption's asymmetric impacts on firm innovation. *Journal of Development Economics,* 118, pp. 216-231.
Petersen, M.A., 2004. Information: Hard and soft. *Working Paper, Northwestern University*.
Petersen, M.A. and Rajan, R.G., 2002. Does distance still matter? The information revolution in small business lending. *The Journal of Finance,* 57(6), pp. 2533-2570.
Pevzner, M., Xie, F. and Xin, X.J.J.o.F.E., 2015. When firms talk, do investors listen? The role of trust in stock market reactions to corporate earnings announcements. 117(1), pp. 190-223.
Pirinsky, C. and Wang, Q., 2006. Does corporate headquarters location matter for stock returns? *The Journal of Finance,* 61(4), pp. 1991-2015.
Platikanova, P. and Mattei, M.M., 2016. Firm geographic dispersion and financial analysts' forecasts. *Journal of Banking & Finance,* 64, pp. 71-89.
Purnanandam, A.K. and Swaminathan, B., 2004. Are IPOs really underpriced? *The Review of Financial Studies,* 17(3), pp. 811-848.
Ritter, J.R., 1984. The" hot issue" market of 1980. *Journal of Business*, pp. 215-240.
Ritter, J.R., 2011. Equilibrium in the initial public offerings market. *Annu. Rev. Financ. Econ.,* 3(1), pp. 347-374.
Rock, K., 1986. Why new issues are underpriced. *Journal of Financial Economics,* 15(1), pp. 187-212.
Rock, M.T. and Bonnett, H., 2004. The comparative politics of corruption: accounting for the East Asian paradox in empirical studies of corruption, growth and investment. *World Development,* 32(6), pp. 999-1017.
Sahlman, W.A., 1990. The structure and governance of venture-capital organizations. *Journal of financial Economics,* 27(2), pp. 473-521.
Schultz, P., 1993. Unit initial public offerings: A form of staged financing. *Journal of Financial Economics,* 34(2), pp. 199-229.

Sherman, A.E. and Titman, S., 2002. Building the IPO order book: underpricing and participation limits with costly information. *Journal of Financial Economics,* 65(1), pp. 3-29.
Slangen, A.H. and Van Tulder, R.J., 2009. Cultural distance, political risk, or governance quality? Towards a more accurate conceptualization and measurement of external uncertainty in foreign entry mode research. *International Business Review,* 18(3), pp. 276-291.
Smajlbegovic, E., 2018. Regional economic activity and stock returns. *Journal of Financial and Quantitative Analysis*, pp. 1-32.
Smith, C.W. and Watts, R.L., 1992. The investment opportunity set and corporate financing, dividend, and compensation policies. *Journal of Financial Economics* 32(3), pp. 263-292.
Smith, J.D., 2016. US political corruption and firm financial policies. *Journal of Financial Economics,* 121(2), pp. 350-367.
Somers, M.J., 1996. Modelling employee withdrawal behaviour over time: A study of turnover using survival analysis. *Journal of Occupational and Organizational Psychology,* 69(4), pp. 315-326.
Stulz, R.M., 2005. The limits of financial globalization. *The Journal of Finance,* 60(4), pp. 1595-1638.
Svensson, J., 2003. Who Must Pay Bribes and How Much? Evidence from a Cross-Section of Firms. *The Quarterly Journal of Economics,* 1(118), pp. 207-230.
Tian, X., Udell, G.F. and Yu, X., 2016. Disciplining delegated monitors: When venture capitalists fail to prevent fraud by their IPO firms. *Journal of Accounting and Economics,* 61(2), pp. 526-544.
Titman, S. and Trueman, B., 1986. Information quality and the valuation of new issues. *Journal of Accounting and Economics,* 8(2), pp. 159-172.
Vial, V. and Hanoteau, J., 2010. Corruption, manufacturing plant growth, and the Asian paradox: Indonesian evidence. *World Development,* 38(5), pp. 693-705.
Walker, T., Turtle, H.J., Pukthuanthong, K. and Thiengtham, D., 2015. Legal opportunism, litigation risk, and IPO underpricing. *Journal of Business Research,* 68(2), pp. 326-340.
Wang, T.Y., 2011. Corporate securities fraud: Insights from a new empirical framework. *The Journal of Law, Economics, & Organization,* 29(3), pp. 535-568.
Wang, W. and Yung, C., 2011. IPO information aggregation and underwriter quality. *Review of Finance,* 15(2), pp. 301-325.
Weber, J. and Willenborg, M., 2003. Do expert informational intermediaries add value? Evidence from auditors in microcap initial public offerings. *Journal of Accounting Research,* 41(4), pp. 681-720.
Welbourne, T.M. and Andrews, A.O., 1996. Predicting the performance of initial public offerings: Should human resource management be in the equation? *Academy of Management Journal,* 39(4), pp. 891-919.
Welch, I., 1989. Seasoned offerings, imitation costs, and the underpricing of initial public offerings. *The Journal of Finance,* 44(2), pp. 421-449.

Welch, I., 1992. Sequential sales, learning, and cascades. *The Journal of finance,* 47(2), pp. 695-732.
Wooldridge, J., 2015. *Introductory econometrics: A modern approach.* Nelson Education.
Zhang, X.F., 2006. Information uncertainty and stock returns. *The Journal of Finance,* 61(1), pp. 105-137.
Zhu, Y., 2009. The relation between IPO underpricing and litigation risk revisited: Changes between 1990 and 2002. *Financial Management,* 38(2), pp. 323-355.